THE AUTOMOBILE

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ONLY FIVE OF THE FIFTEEN WILL QUALIFY

Entrants for the American Elimination Trial Ready for the Opening Race Over the Vanderbilt Course on Long Island

GARDEN CITY, L. I., Sept. 20.—Fifteen high-speed efforts of American manufacturers are ready for the Elimination Trial at break-o'-day on Saturday morning. Five of this number will have the honor of representing America in the international struggle of October 6. This year the American candidates will participate in a race of exactly the same mileage as that of the Cup struggle itself, and there will be no changing of the five that finish in the lead, the Vanderbilt Cup Commission reserving no discretion whatever in the matter of substitution. This is as it should be, and a hard-fought battle is assured over the Long

THE GRANDSTAND AND OFFICIAL STAND ON THE JERICHO TURNPIKE NEAR WESTBURY, WHEN NEARLY COMPLETED.

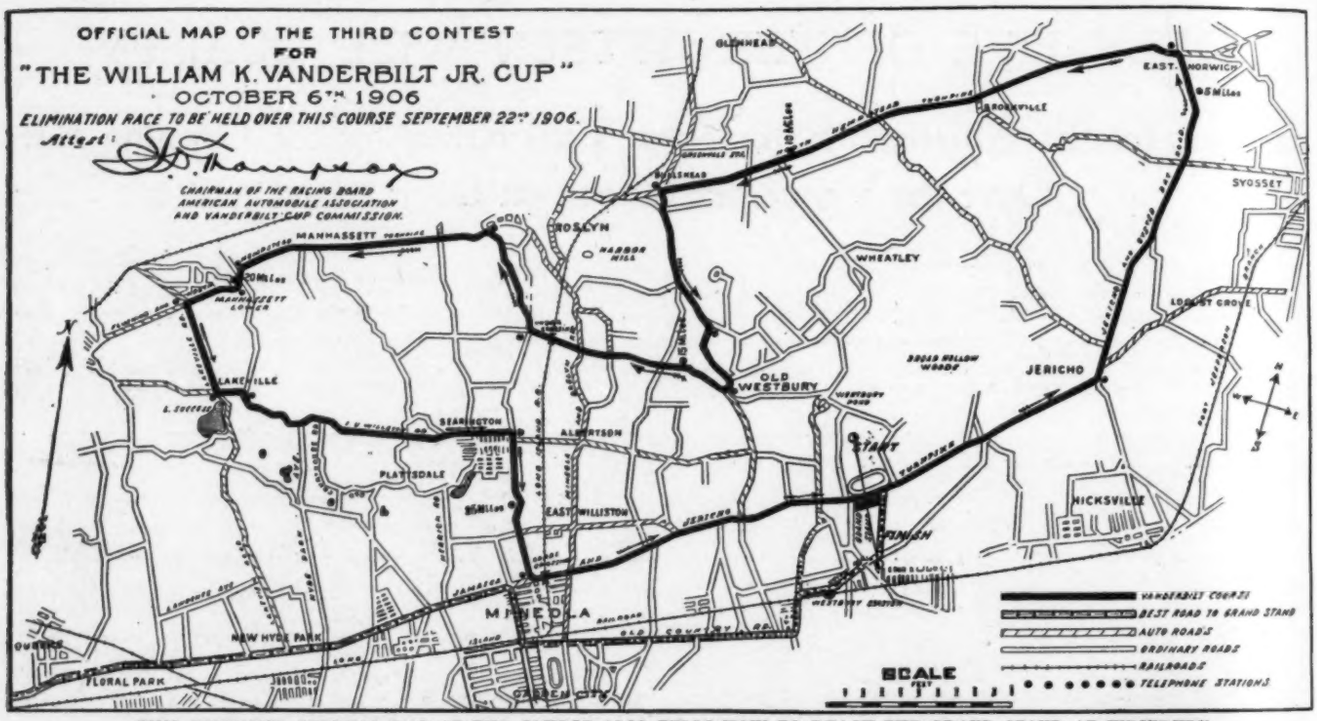
Island course. Five good survivors should evolve for the big race.

While all calculations are likely to go astray—automobile racing being an uncertain quantity—the experts figure that Joe Tracy and his Locomobile ought to be one of the quintette. The chances of the three Thomas cars are well thought of, the long experience of Callois and Le Blon being a great item in their favor. The Frayer-Miller trio is a source of much speculation, and the air-cooled advocates will watch these machines with intense interest.

One who has attracted attention in the preliminary practice is George Robertson, and his 90-horsepower Apperson has made some very fast circuits, and might have gone even better. Lytle and his Pope-Toledo form another good combination, and there are those who have faith in Mongini and his Matheson.

Christie had another run of hard luck in the practice, and the second time he ran into a telegraph pole his racer joined the down-and-out club. In consequence he will drive his touring car. There is general admiration for his persistency.

Owing to the fact that several drivers with practically no racing experience were included in those who participated in the early morning practice, fears were expressed that an accident of magnitude might result. A few close calls there were, and, strange to say, the principals were race pilots of proven quality. It is often the man who feels too confident, rather than the one who is doubtful, that gets into trouble and takes too long a chance. Of the ten days allowed for practice, unfavorable weather interfered a couple of times, but a half dozen of the entrants were late in arriving on the course. This may have had something to do with the small number of accidents, the smashing of the Christie and Apperson cars being the distressing events. Christie's concluding set-to with the telephone pole destroyed his racer, but he escaped injury. The Apperson catastrophe was more serious, Driver Robertson and Mechanic Warren both being taken to the Nassau Hospital with broken bones. The car was a complete wreck, and it was more than doubtful if another machine could be gotten ready in time for Saturday.



THIS COMPLETE OFFICIAL MAP OF THE COURSE ALSO TELLS HOW TO REACH THE GRAND STAND AT WESTBURY.

"Wally" Owen has been placed in command of the eight-cylinder Maxwell, and though both he and his machine are handicapped by lateness on the course, this pair may prove one of the surprises of the race. Keeler and his Oldsmobile are expected to do some consistent traveling, and the same can be said of John Haynes and the car of the same name. The B-L-M figures as the experiment of the contest, and it is mere guesswork as to what it can do.

In the past few days there has been an enormous amount of work accomplished on the course. The delayed oil finally arrived, and Chairman Thompson saw to it that the sprinkling carts were made busy. He also kept at the road makers, and several bad places were quickly repaired. While it is true that the course is not a park boulevard for the entire circuit, it answers as a diversified place for a road contest, which is not included in the same sport category as lawn tennis playing. The absence of rain for many weeks, and the extremely hot weather of August and early September, materially prevented the ideal course which the Commission had hoped for. While it has been predicted that the speed of a year ago would not be equaled on account of the increase in the number of turns, it should be remembered that the cars in practice did not extend themselves for an entire circuit.

The first car will be sent away at promptly 6 o'clock, and the others will follow at intervals of one minute each. The drawing for the order of start took place on Saturday night last at the Garden City Hotel, with the following result:

No.	Car	H.P.	Entrant	Driver	Start
1	Oldsmobile...	45	F. L. Smith.....	Keeler.....	6:00
2	Pope-Toledo..	120	A. A. Pope.....	Lytle.....	6:01
3	Matheson....	60	C. A. Singer.....	Mongini.....	6:02
4	Thomas.....	115	E. R. Thomas.....	Caillois.....	6:03
5	Maxwell.....	80	Maxwell-Briscoe Co..	Owen.....	6:04
6	Thomas.....	115	C. A. Coey.....	Le Blon.....	6:05
7	Thomas.....	115	H. S. Houpt.....	Roberts.....	6:06
8	Frayer-Miller	110	O. S. Lear.....	Frayer.....	6:07
9	Christie.....	50	Walter Christie.....	Christie.....	6:08
10	Apperson....	80	E. L. Apperson.....	Robertson.....	6:09
11	Frayer-Miller	110	W. J. Miller.....	Lawwell.....	6:10
12	Locomobile..	90	S. T. Davis, Jr.....	Tracy.....	6:11
14	Haynes.....	60	John Haynes.....	Haynes.....	6:12
15	B.L.M.....	85	Sidney Breese.....	Dolbeau.....	6:13
16	Frayer-Miller	110	J. F. Stone.....	Belden.....	6:14

In order to satisfy the superstitious, "No. 13" was obliterated from the drawing, both Chairman Thompson and Mr. Vanderbilt being included among those who were inclined to avoid the so-called unlucky numerals.

OILING THE COURSE AT THE FATED HARNESS SHOP.

THE POPE-TOLEDO RECEIVING ITS DAILY MASSAGE.

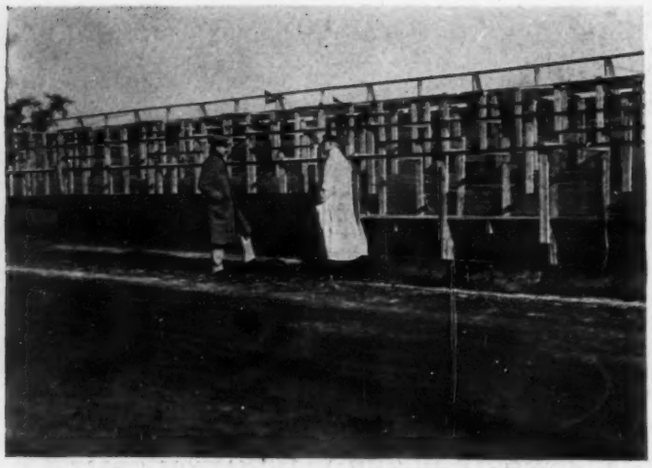
MECHANICAL DETAILS OF AMERICAN CARS THAT COMPETE IN THE ELIMINATION TRIAL.

Name	Weight	Frame	Front Axle	Rear Axle	Wheels	Rims	Tires	Brakes
Pope-Toledo	2203.	Inverted U-sec'n.	I-beam (alloy steel)	I-beam (alloy steel).	Wood.	Ordinary	Diamond	Band brakes on hub drums; foot brake on transmis'n.
Thomas (3 cars).	2207.	Hammered steel (channel sec'n)	I-beam (hand forged)	I-beam (hand forged).	Wood	Detachable on rear wheels.	Diamond	Expanding in hub drums; one on countershaft drum
Frayer-Miller (3 cars)	1850	Pressed steel (channel sec'n)	Tubular	Tubular (floating driving shafts)	Wire.	Ordinary	Diamond, 34x4 & 34x3½	Internal and external hub brakes.
Locomobile	2185.	Pressed steel (channel sec'n)	I-beam (alloy steel)	I-beam (alloy steel).	Wood.		Diamond, 34 x 3½ & 34 x 4½.	Emergency brakes on rear wheels, running brake on countershaft.
B-L-M	1800.	Pressed steel (channel sec'n)	I-section	I-section	Wood.	Ordinary in Elimination.	Diamond, 34 x 3½ & 34 x 4½.	Expanding in hub drums; band on countershaft.
Apperson	2150.	Pressed steel (channel sec'n)	I-beam	I-beam	Wood.	Ordinary	Diamond, 34 x 3½ & 34 x 4½.	Band on rear hub drums, and on transmission.
Maxwell	?	Pressed steel (channel sec'n)	Tubular	Tubular live axle	Wire.	Ordinary	Diamond	Expanding and band, both in rear hub drums.
Matheson	2200.	Pressed steel (channel sec'n).	I-beam	I-beam	Wood.	Ordinary	Diamond, 34 x 4 & 34 x 4½.	Drum brakes on rear wheels.
Christie	2204.	Channel steel.	None (wheels on ends of crankcase).	I-beam	Wood.	Detachable.	Diamond, 30 x 4.	Drum brakes on rear wheel.
Haynes	2200.	Pressed steel (channel sec'n)	I-section	Tubular live axle	Wood.	Ordinary	Diamond	Expanding and band, both in rear hub drums.
Oldsmobile	2000.	Pressed steel (channel sec'n)	I-beam section.	Tubular	Wood.	Detachable.	Diamond, 34 x 4	Expanding in hub drums; and foot brake on transmission.

Name	H.P.	Drive Ratio*	Cyl.	How Cast	Stroke	Bore	Cooling	Radiator	Valves	Carbureter
Pope-Toledo	120		4	In pairs	6½	7½	Copper water jackets	Flat tubes with fins.	In head; all mechanical.	Float-feed; compensating.
Thomas (3 cars)	115	133. to 1	4	In pairs	5½	6⅞	Integral water jackets	Thomas - Fedders Cellular	Mech. operated; inlet over exhaust.	Automatic, with dash-pot regulation
Frayer-Miller (3 cars)	110	1 to 1	4	Separately	6	7½	Air jackets	Air blower	Mech. operated; opposite	Frayer-Miller.
Locomobile	90	1.18 to 1	4	In pairs	6	7½	Copper water jackets	Cellular	All mech. inlet in head exhaust at side.	Float-feed; compensating.
B-L-M	85	1.69 to 1	4	Separately	6	6	Water cooled	Cellular	All mech. inlets by exhausts.	Automatic.
Apperson	80	1.64 to 1	4	Separately			Integral water jackets	Cellular	Mech. operated; inlets opposite exhausts.	Krebs type.
Maxwell	80		8	Separately	5	5	Integral water jackets	Briscoe cellular	All mech.; inlets opposite exahusts.	Regular Maxwell.
Matheson	60		4		6	6	Integral water jackets	Cellular	In heads. All operated by overhead camshaft.	Multiple-port.
Christie	50		4	Separately			Copper water jackets	Cellular	Inlets above exhausts.	
Haynes	50	1.5 to 1	4	Separately	6	5¼	Integral water jackets	Briscoe cellular	All mech. Inlets opposite exhausts.	Schebler.
Oldsmobile	40–45	2 to 1	4	In pairs	4¼	4½	Integral water jackets	Cellular	All mech. Inlets by exhaust.	Kingston.

Name	Ignition Current	Spare Plugs	Change-Speed Gears	Clutch	Drive	Bearings	Wheel Base	Tread
Pope-Toledo	Remy magneto and single Remy coil.		Selective sliding gear; 4 speeds and reverse.		Double chain	American Hess-Bright		
Thomas (3 cars).	High tension magneto	Thomas mica.	Selective sliding gear; 3 speeds and reverse	Cone, with locking bolts	Double chain	Annular-ball		
Frayer-Miller (3 cars).	Storage battery; single high-tension and single low tens'n.		Belden, 2 speeds forward and reverse		Propeller shaft	Hess-Bright		
Locomobile	Low tension magneto, 1 coil. Auxiliary H.T.	Standard Locomobile.	Sliding gear, 3 speeds and reverse		Double chain	Hess-Bright		
B-L-M	Low tension magneto, 1 coil for starting.	Make-and-break ign'rs.	Selective sliding gear, 4 speeds & reverse.		Double chain	Hess-Bright	112-inch	54-inch.
Apperson	High tension Remy magneto & storage battery.	Comet	Selective sliding gear, 4 speeds & reverse.		Double chain			
Maxwell	Witherbee storage cells. 8-unit high-tension coils.		3 speeds and reverse		Propeller shaft	Hyatt roller and Annular ball		
Matheson	Low-tension magneto	Make-and-break ign'rs.	Selective sliding gear. 4 speeds & reverse.	Multiple-disk.	Double chain	Plain	112½-inch	56-inch.
Christie					Direct spur gearing.			
Haynes	High-tension magneto and storage battery. Splitdorf coil.	Comet	Selective sliding gear. 3 speeds & reverse.		Propeller shaft; roller bevel pinion.	Roller		
Oldsmobile	Witherbee storage cells. Six-unit Connecticut coil.		Selective sliding gear. 3 speeds & reverse.	Reversed-cone	Propeller shaft	Timken roller	106½-inch	55-inch.

*Number of engine turns to one turn of the drive wheels, on the high speed.



DONOR VANDERBILT AND CHAIRMAN THOMPSON HAVE A TALK.

CHAIRMAN THOMPSON HURRIES THE ROADS REPAIR WORK.

MECHANICAL DETAILS OF THE RACERS.

Despite the trend evident upon the part of some of the foremost American designers towards an unreserved acceptance of foreign designs for racing cars, there are nevertheless enough distinctive machines listed for the Elimination Trial to show that American ingenuity is not yet prepared to concede everything to foreign ideas.

The Christie, the Maxwell and the three Frayer-Millers are distinctly American, possessing little in common with their competitors. The Christie represents a radical deviation from popular standards, doubly deserving because of the prominence of its designer as an engineer in another field where mechanical ideals are high.

The Maxwell car is really an outgrowth of a very successful medium-priced car, given especial strength by special construction and great power by multiplication of cylinders. The Frayer-Millers represent a high development of the almost exclusively American system of air-cooling, and the rapid success of these cars in the field of high-powered touring machines makes their advocates predict sure success for them in this great road test.

Of the other cars, the Pope-Toledo, similar to the 1907 touring model of the same great firm; the three Thomases, to the design of which the best engineers of two continents have contributed; the Locomobile, to be remembered because of its work in previous Vanderbilt Cup races; and the Apperson, the Matheson, the Haynes and the Oldsmobile, all products of foremost American concerns, and several of them virtually stock touring cars, represent the American trend towards the adoption of all that is best in foreign practice. That the American maker will improve ultimately upon what ideas he borrows is even now apparent.

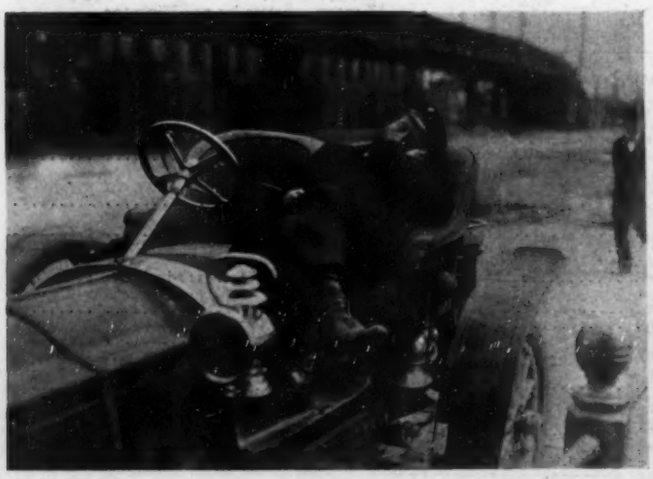
As will be readily seen from the accompanying table, there is less variety of construction than in former years, and, no matter what car wins, its triumph consequently must be regarded as a victory for the new conveyance as a whole, as much as for the particular makers that carry away the premier honors.

VANDERBILT TO DRIVE IN VANDERBILT.

Unable to resist the call of speed, William K. Vanderbilt, Jr., succumbed to its forceful allurement after a ride in the fog early Tuesday morning—a fog so thick that it prevented record traveling on the Long Island course. Mr. Vanderbilt's journey around the circuit, which resulted in his return to the list of racing drivers, was made in the 125-horsepower Mercedes originally entered by C. L. Charley, of Paris, and to have been driven by Mariaux under the colors of the German Automobile Club.

Later in the day Secretary S. M. Butler, of the Automobile Club of America, which acts as the foreign correspondent of the A. A. A., cabled the German Automobile Club, asking for its approval in the substitution of the name of Vanderbilt for that of Mariaux, thus confirming a story that the American enthusiast had bought another Mercedes, the same kind of a machine which he once drove to the then world's record of :39 4-5 on the Ormond-Daytona beach.

Mr. Vanderbilt a couple of years ago competed in several of the big European events and in this country was a participant in two Florida meets. Thoroughly acquainted with the Long Island course, daring to the limit of recklessness, the young millionaire now will gratify his longing to participate in the big race for his own cup. He will be a most dangerous contender.



LE BLON "NAPS" WHILE "WAITING AT THE FERRY."

IN FRONT OF THE THOMAS HEADQUARTERS AT KRUG'S.

PILOT GEORGE ROBERTSON AND MECHANIC WARREN AND THE 90-HORSEPOWER APPERSON RACER, OF WHICH MUCH WAS EXPECTED.

WHY THEY BUILT A CAR FOR THE RACE.

In answer to the question as to why the Oscar Lear Company built three cars for the Vanderbilt race, Oscar Lear says:

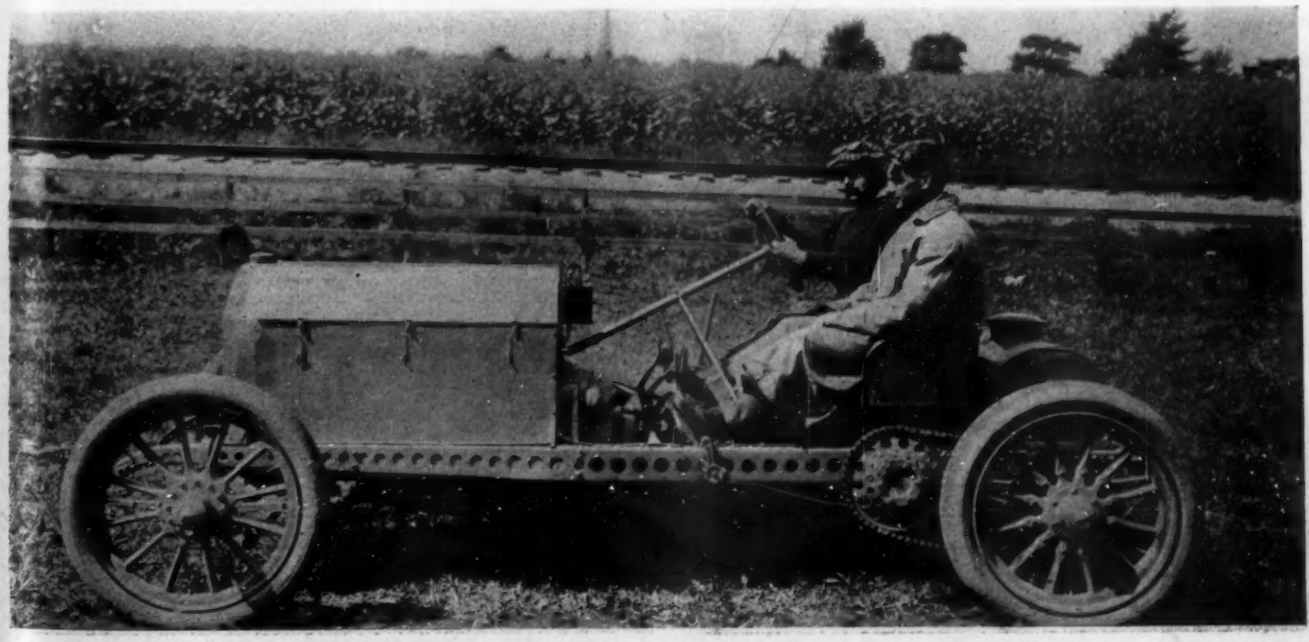
"We have entered three Frayer-Miller cars in this great event in the hope and expectation of being able to show once for all that the Frayer-Miller system of cooling is the best so far devised. Without going into details, this system is a well-known one, using a large centrifugal blower to force a blast of air around each cylinder through jackets which surround the cylinder. We have found this system to be very valuable in touring cars, and we think it is a great improvement over any other system of cooling. If upon equal terms we can show that we are the peer of the best cars so far produced, we think we have made our point; and believing that the result will show that we are able to do this, we have built these cars and entered them, and are going after the big prize. At any rate we will do our best."

GOSSIP OF THE ELIMINATION AND CUP.

In the rear of the grand stand the Automobile Club of America, New York Motor Club, and Long Island Automobile Club, will entertain their members and friends, each organization having secured a plot of ground on which to erect a tent.

If the plans of Harry S. Houpt are successfully carried out, he will sail aloft at 4 A. M. Saturday morning, carrying with him as a guest of honor E. R. Thomas, the Buffalo manufacturer of the car which he represents in the Metropolitan district. It is said that a well-known aeronaut has agreed to fill the order of Mr. Houpt, who thinks a grand-stand balloon a most excellent thing for watching an automobile road race.

Ralph Mongini, the driver of the Matheson car, was born at Milan, Italy, in 1870. He is a graduate of the Polytechnique Institute, Zurich, Switzerland, with the degree of M.E. For a number of years he was head designer for the Benz car, with



RALPH MONGINI AND TOM COOPER WITH THE 60-HORSEPOWER MATHESON TOURING CAR, FOR WHICH RACING SPEED IS CLAIMED.

SHERIFF GILDERSLEEVE TAKES A CORBIN OFFICIAL CAR RIDE.

THE WHITE STEAMER THAT HAULS ANY SORT OF LOAD.

which in 1894 he won the touring car championship at Milan, Italy. He was the first man to introduce the automobile in South Africa, Johannesburg. He has been prominently allied with automobile interests in Europe, until he drove the Matheson in the elimination trial in 1906. Mongini's mechanic is John Green, who served in the same capacity last year. Green was born in Boston, Mass., in 1886. He has had four years practical experience, and is well qualified for the work.

The Diamond Tire Company, which is supplying tires for all of the American Elimination entrants, has established eight tire stations around the course located as follows: Krug's Corner, Jericho, East Norwich, Bulls Head, Old Westbury, Roslyn, Great Neck Turn, Lakeville, and possibly one at the grand stand. The company has sent $175,000 worth of tires to its various stations.

One of the features of the three Thomas cars entered in the Vanderbilt cup race is what is known, for want of a more technical term, the "dog-cutter." This consists of a convex V-shaped piece of wood, which is fitted to the cross-steering rod, extending almost its entire length. The apex of this wooden bar is brought to a sharp-cutting edge, and the whole is bound to the cross rod with copper wire.

There is a little harness store at Krug's Corner on the Jericho Turnpike, and every morning during the preliminary practice there has been betting as to whether one of the eliminators would not eliminate himself and the harness shop while negotiating the corner. The owner of the shop has been very watchful, and before October 6 it is expected that he will have accumulated a plentiful supply of gray hairs.

The trio of Fiats, to be driven by Lancia, Nazzaro and Weillschott on October 6, are now located at Porrier's, Garden City, awaiting the arrival of their racing pilots, now en route.

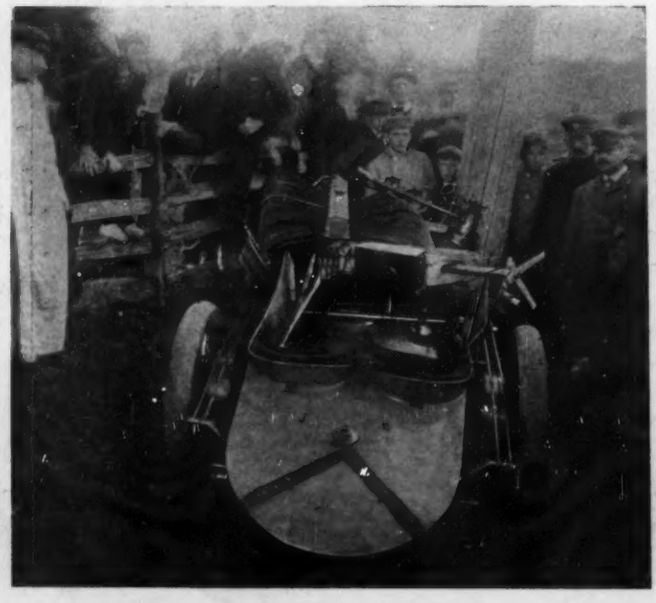
Both Cagno and Fabry, with their Italas, will be located on the course by the end of the week. There is a possibility that the once famous Fournier, who is now the agent for France for the Itala, will come over for the October 6 event.

Five of the American Elimination entrants will use the oiler, and the Pedersen Manufacturing Company has offered a prize of $100 to the mechanic of the first car in of the five, which includes the three Frayer-Millers, Christie and Matheson.

VARIOUS DISTANCES AROUND THE COURSE.

One who has a penchant for statistics has calculated these various distances around the course:

Grandstand to Jericho	2 3-5
Jericho to East Norwich	3 3-5
East Norwich to Bulls Head	5 4-5
Bulls Head to Old Westbury Hairpin	2 2-5
O. W. Hairpin to Mineola Avenue	2 3-5
Mineola Avenue to North Hempstead Pike	1
North Hempstead Pike to Manhasset Turn	3 3-5
Manhasset Turn to Lakeville	1
Lakeville to Albertson	2 2-5
Albertson to Krug's Corner	1 2-5
Krug's to Grandstand	3 3-10
Total	29.7



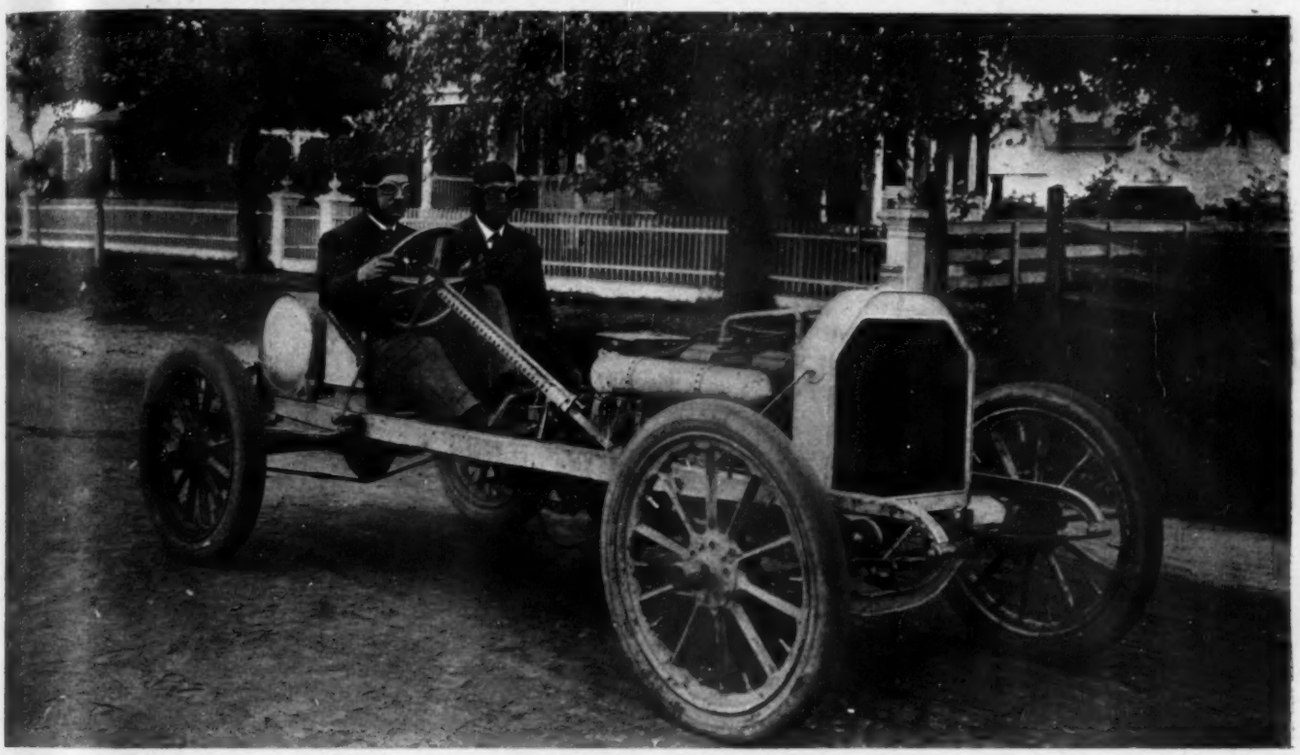
CHRISTIE'S RACER AFTER IT TACKLED THE TELEPHONE POLE.

WHERE THE MAXWELL CAMP IS LOCATED.

OLDSMOBILE VANDERBILT CUP RACER.

It is the boast of the Olds Motor Works that the Oldsmobile racer, entered as a competitor in the elimination trials for the Vanderbilt Cup race, is in all its main features a regular stock model, and that any honor that may accrue to the racer will be rightfully shared by every touring car of this model sold. Naturally there are some changes from the touring car design, but these are of a minor nature, and are only such as are necessary to fit the car to run at the highest speed the engine will drive it, and to make it readily controllable at top speed. Motor, transmission, framing—all are exactly as in the Oldsmobile four-cylinder touring car of the 1907 model.

Generally speaking, the design of the motor is the same as that of the 1906 Oldsmobile four-cylinder car, with mechanically operated valves, all on the same side and operated by a camshaft with integral cams hardened and ground to size; a leather-faced cone-clutch; change-speed gears of the selective type; and final drive to the live rear axle through propeller shaft and bevel gears giving a reduction of 2 to 1. The motor is rated at 40-45-horsepower.



ERNEST KEELER AND THE OLDSMOBILE WHICH WILL START FIRST IN THE AMERICAN ELIMINATION TRIAL.

Cylinders are cast in pairs, with the usual modern arrangement of integral heads, water jackets and valve chambers; the cooling water is piped in at the bottom of the jackets, on the right-hand side, and is drawn off, hot, from the top at the center. The circulating pump is of the gear type and gear driven, and is set into a recess in the crankcase. The water is strained after passing through the cellular radiator. In passing around the cylinders the flow of water is deflected so as to keep the valves properly cooled and avoid pockets.

All the valves in the engine are of the two-piece type, the stems being screwed into the heads, brazed and riveted over. Small helical springs keep the push-rods in constant contact with their cams, preventing clattering and battering at high motor speeds. The crankshaft bearings and the big end bearings of the connecting rods are of Parsons white brass, while the piston-pin bushing is of hardened and ground steel.

Ignition is by jump spark, the coil being mounted on a rigid bracket immediately in the rear of the fourth cylinder; just under the coil is the timer, on a vertical shaft, gear driven. The carbureter is a 1 1-2-inch Kingston, secured direct to the intake piping. Change-speed gearing is of the selective type, givng three forward speeds, with direct drive on the high; the reverse is fitted with a spring for automatic release. Gearcase is carried on a three-point suspension.

The gasoline tank, which is peculiar to the racer, is of tubular construction to stand the hard work, and is anchored in a cradle of hickory slats, resting, in turn, in aluminum castings bolted to the main framing of the car. Heavy leather straps, for use as emergency fastenings, pass around either end of the tank. The gasoline capacity is 25 gallons. The filling hole is very large and the cover is held in place by a hand wheel and screw arrangement, a lead washer answering for packing to make the joint air-tight. Gasoline is forced to an auxiliary tank by air pressure, running thence to the carbureter by gravity.

Hub brakes are of the internal expanding type, while the transmission brake is a contracting band lined with camel's hair. Lubrication of the motor is by splash, an oil pump in the crankcase maintaining a constant level. Loss of oil is made up for by oil contained in an auxiliary tank and sent to the crankcase by a hand pump with three-way valve.

Framing is of channel steel 3 1-2 inches deep and 1 1-2 inches wide, thoroughly gusseted and braced. Motor and transmission are carried on sub-frames, the whole being the same as in the 1907 stock touring car.

E. V. HARTFORD SECURES THE VINET RIM.

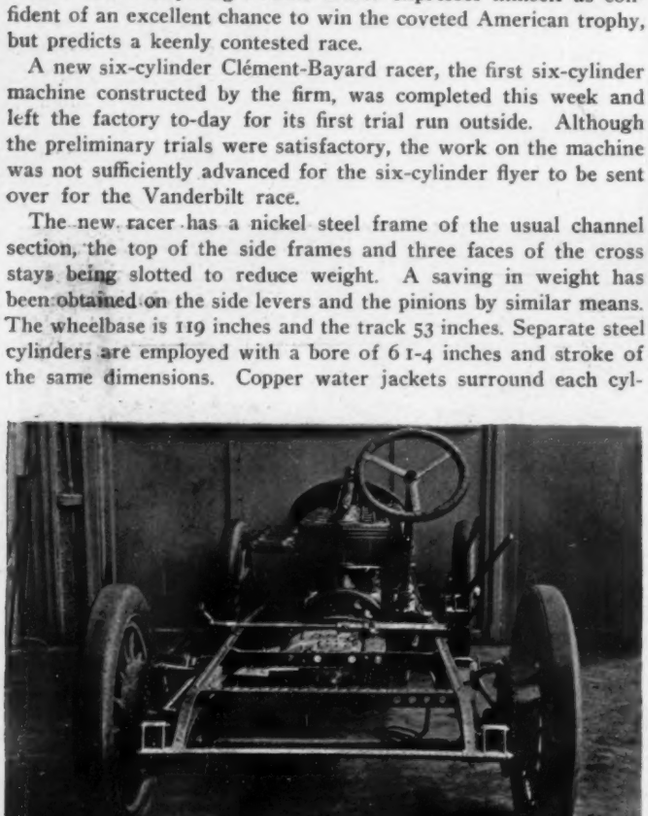
E. V. Hartford, president of the Hartford Suspension Company, has perfected arrangements to manufacture and market in this country the Vinet detachable rim which Szisz used on his Renault in the Grand Prix. According to the arrangements the Hartford Company will immediately undertake the manufacture of these rims. It will be some time before the rims are placed on the market, but in the meantime orders are being booked and will be filled in the order in which they are received.

CLEMENT "SIX" NOT FOR VANDERBILT

PARIS, Sept. 7.—Albert Clément's racer was packed to-day at the Levallois factory on the banks of the Seine, ready for shipment to New York, and will leave Havre on Saturday, September 15. The machine is the one which was run in the Grand Prix and the Ardennes race, and has undergone no further change than the substitution of dismountable for fixed rims. Albert Clément and his mechanic, Vénus, will sail from Havre a week later, on September 22. The young French driver expresses himself as confident of an excellent chance to win the coveted American trophy, but predicts a keenly contested race.

A new six-cylinder Clément-Bayard racer, the first six-cylinder machine constructed by the firm, was completed this week and left the factory to-day for its first trial run outside. Although the preliminary trials were satisfactory, the work on the machine was not sufficiently advanced for the six-cylinder flyer to be sent over for the Vanderbilt race.

The new racer has a nickel steel frame of the usual channel section, the top of the side frames and three faces of the cross stays being slotted to reduce weight. A saving in weight has been obtained on the side levers and the pinions by similar means. The wheelbase is 119 inches and the track 53 inches. Separate steel cylinders are employed with a bore of 6 1-4 inches and stroke of the same dimensions. Copper water jackets surround each cyl-



CHASSIS OF CLEMENT SIX-CYLINDER RACING CAR.

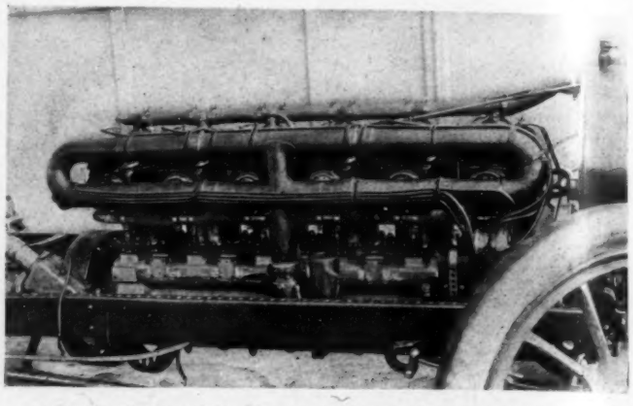
inder. At 1,300 revolutions the engine develops 160 horsepower. Inlet and exhaust valves placed on opposite sides of the engine are mechanically operated. The crankshaft has seven bearings, the crankcase being in one piece without division and the distribution gearing completely enclosed in oil-tight cases. The carbureter is a Bayard, water circulation is by gear-driven pump, a Geta honeycomb radiator is used with a belt-driven fan between it and the engine. The magneto is a high-tension Simms-Bosch; accumulators are also carried. The clutch is of the concentric disk type, transmission being by countershaft to side chains. There are three speeds and a reverse, with double sliding gear, and direct drive on the high. Lubrication is by gear-driven pump carried on the same shaft as the magneto.

Three brakes are employed, on the road wheels by hand lever, on the differential by foot lever, and on the rear road wheel drum by foot pedal. The dimensions of the wheels are 34 by 5 and 34 by 4 1-2 inches, tires and detachable rims being of Michelin make. The total weight of the car is 1,002 kilograms.

Monday, September 3, thirty-two cars started in the five days' contest for the Auvergne Cup, organized by the Auvergne A. C. The cars are divided into six classes, according to their cylinder capacities, and are supposed to cover the course at certain average speeds, varying from 25 kilometers to 40 kilometers an hour, according to their rating.

WAGNER WILL DRIVE THE DARRACQ.

PARIS, Sept. 17 (By cable).—The Darracq Company has decided to send Wagner to drive its car in the Vanderbilt Cup race, replacing Hemery, who was originally scheduled for this honor. Wagner sailed on the *Mongolian* yesterday for Montreal, from which port he will go direct by rail to New York. The Darracq cup racer was shipped by the *Majestic* to New York. In the



INLET VALVE SIDE OF CLEMENT SIX-CYLINDER MOTOR.

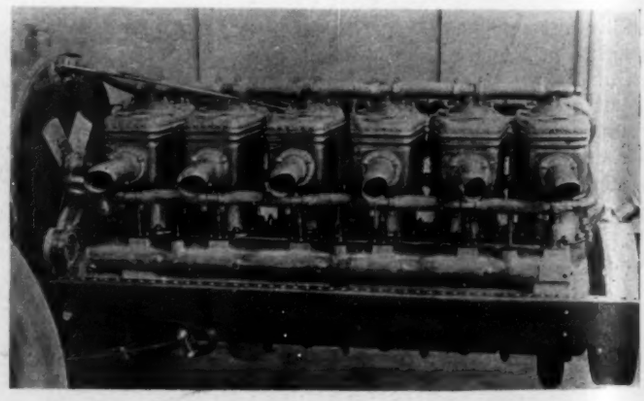
Grand Prix event this car had the ordinary type of rims, but in the Vanderbilt race will use the Michelin detachable rims.

Wagner drove one of the Darracqs in last year's Vanderbilt race, and in the fourth round of the course had his machine disabled by the loss of its gearbox cover, which allowed so much oil to escape that one of the bearings seized, and the car was put out of commission. He is known as a consistent driver, and held for a time the kilometer and mile records. He made the first two rounds of last year's race at the speed of 68 miles per hour, a speed which was exceeded only by Lancia, Jenatzy and Szisz. His teammate, Hemery, whom he replaces in this year's race, won last year's event.

AUTOMOBILE AMBULANCE IN MUNICH.

Consul-General William F. Wright reports from Munich that the Ambulance Brigade of Munich has just received an automobile ambulance which seems to have proved satisfactory in actual service.

The body of the car has a covered top, and a four-cylinder 18 to 22-horsepower motor engine furnishes the power. The body is so arranged that the stretcher is carried on one side, with seating places for three persons on the other. By a simple



BATTERY OF EXHAUST PIPES ON THE CLEMENT "SIX."

arrangement the carrier for the stretcher can be hooked up, making the car into an ordinary six-seated omnibus. There are also two additional seats, one at the front and one at the back of the interior of the car, and all of the seats are so arranged that the attendants can see the patient while he is in the ambulance.

MOTOR BOAT CARNIVAL ON THE HUDSON

MOTOR boatists had their innings last week on the Hudson river, the occasion being the National Motor Boat Carnival given under the auspices of the Motor Boat Club of America. The carnival opened on Monday with a reliability contest in which nine boats, most of them new this season, were entered. Competition was based in this event upon a certain number of points for different elements of reliability, and awards were made according to the following maximums: Reliability, 100; speed, 100; general condition after trial, 50; economy of fuel, 30; efficiency of reversing arrangements, 25; ease of control, 15, and starting of engine, 25.

The contest was practically a six-hour run over a 101 1-4-mile course, starting from the Motor Boat Club's clubhouse, at the foot of West 112th street, New York City, and was won by the *Sparrow*, a 30-foot boat with a Packard motor of 31.8 horsepower, owned by C. J. Swain, which led at the finish with a total of 242 points out of a possible 245, with the *Simplex VI*, 31.8 horsepower, owned by A. D. R. Smith, second, and the *Decoy*, 31.8 horsepower, owned by J. L. Breese, third.

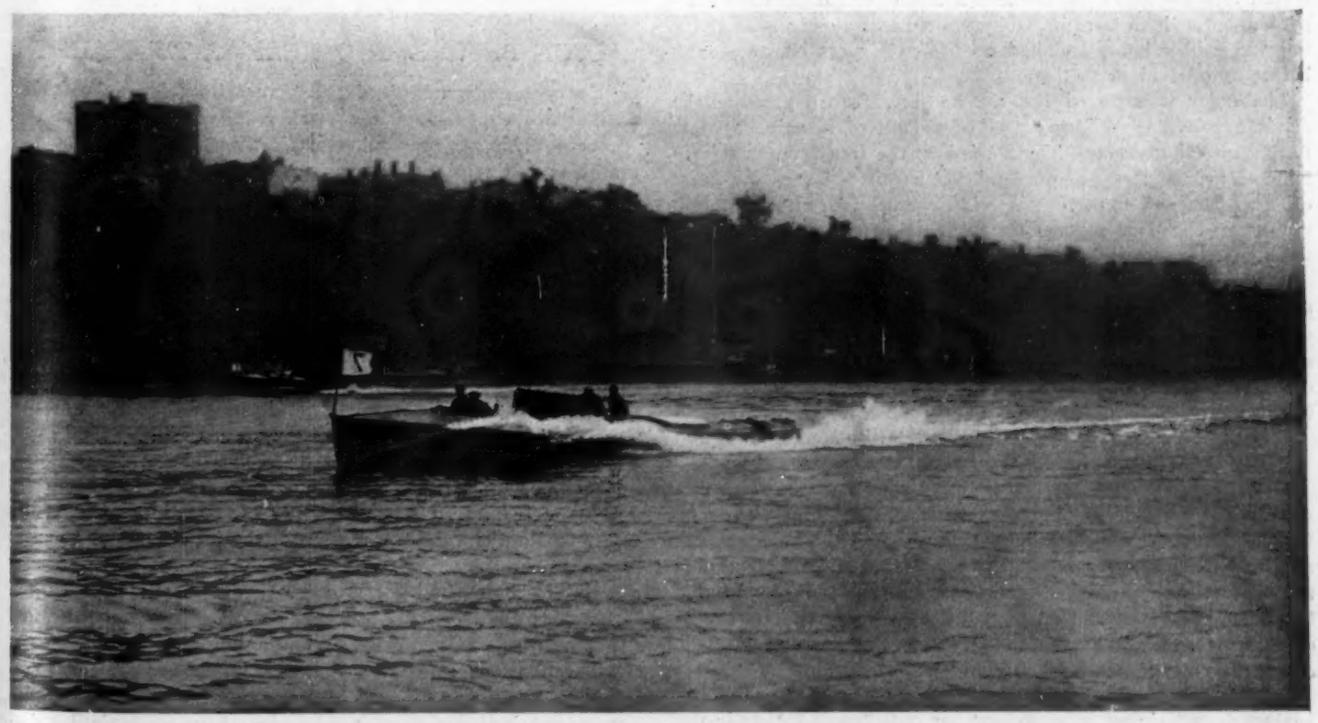
Tuesday's event was a long-distance race to Poughkeepsie and back, a distance of 115.6 knots—about 130 statute miles. Of the nine boats that started, the winner again proved to be the *Sparrow*, this time on her liberal time allowance, her running time being 6:45:55. The best time was made by Payne Whitney's new cabin cruising boat, *Artful*, with a time allowance of 1:56:14, which made the trip to Poughkeepsie and back in 6:05:33, an average speed of 21.93 statute miles, while the *Sparrow* did 19.74 statute miles. The latter's time allowance was 3:37:27. The *Artful* is 70 feet in length and has 130-horsepower motors. The scratch boat was J. F. Anderson's *Irene*, with 201 horsepower, but it was impossible for her to win, as she would have had to have made 37 knots per hour, a speed no motor boat has attained as yet. *Simplex VI* was third. The record for the course, an average of 26 miles an hour, made by *X. P. D. N. C.* in the last race, was not approached.

Wednesday's feature, and what proved to be the real feature of the week's meet, was the mile championship and the kilometer championship, both of which were run at the same time, the kilometer time being taken during the nautical mile championship race. Price McKinney's *Standard*, with 300-horsepower motor, took both events, her time with the tide for the nautical mile being 2:10, at the rate of 27.69 nautical or 31.84 statute miles per hour. For the kilometer her time was 1:07, which was equal to 33 1-3 statute miles per hour. Both the above times are world's motor boat records. After the record breaking time trials of the morning, the afternoon of Wednesday was devoted to the American championship, free for all, over a triangular course of 30 3-4 miles. E. J. Schroeder's *Dixie*, fitted with S. & M. Simplex motor of 132.72 horsepower, won in 4:20:01.

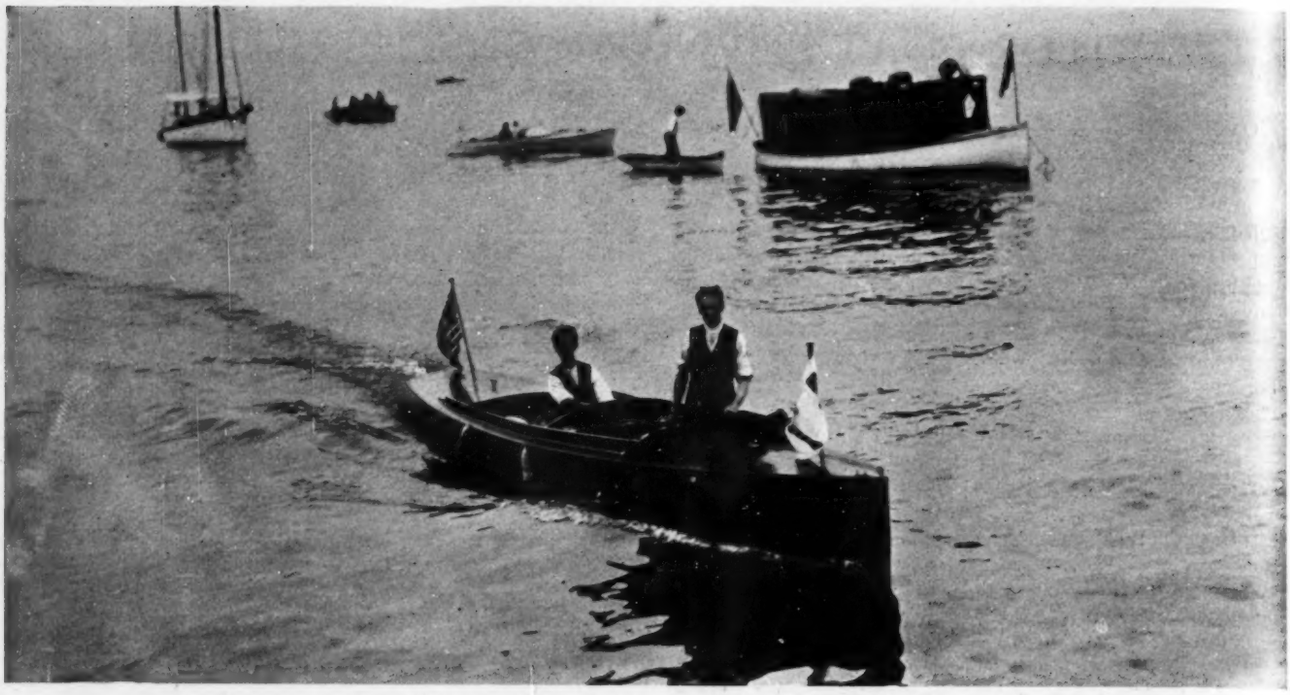
In Thursday's events six classes of motor boats started. Three of the races were over a 16-mile course and three over the 30 3-4-mile course. The shorter distance races were for cruising boats 40 to 60 feet and 30 to 40 feet in length and open launches, and were won by the *Sheboygan*, owned by J. L. Reiss; the *Tuna*, owned by H. M. Crane, and the *Magneto*, owned by Fred Komp, respectively. The longer distance events were for high-speed boats 39.37 feet or under, 40 feet and over, and 33 feet and under, and were won respectively by E. J. Schroeder's *Dixie*, H. M. & B. A. Baruch's *Skedaddle*, and J. R. Jackson's *Yvonne*.

The last event of the day, the race for 33-footers, was marked by the first accident of the week, H. L. Bowden's *Mercedes U.S.A.* taking fire during the progress of the race. As she neared the finish line she stopped suddenly and a moment later flames shot into the air. Mr. Bowden, his engineer, Charles Basle, and James Barr, captain of Mr. Bowden's steam yacht *Sally*, were in the *Mercedes* at the time and were forced by the advancing flames to jump overboard in the river, from which they were rescued by boats from the revenue cutter. The fire, which was caused by an overflowing carbureter becoming ignited, was extinguished by chemicals before the boat was badly injured.

Eighteen boats contested in Friday's events, and fast time was made in spite of the fact that the water of the Hudson was very rough at times. There were two classes of cruising boats that covered a course of 16 miles and three classes of high-speed boats



300-H.P. MOTOR BOAT "STANDARD" THAT CAPTURED WORLD'S MILE AND KILOMETER RECORDS.



THE "SPARROW" FITTED WITH PACKARD MOTOR, WHICH WON THE RELIABILITY AND LONG-DISTANCE EVENTS.

that covered 30 3-4 miles. The *Dixie* made the fastest time in her class over the long course, 1:19:06, at the rate of 23.54 nautical miles per hour, and winning her race, with J. H. Hoadley's *Den* second. The *Skedaddle* and *Yvonne* were also winners in their classes, and the cruising boat classes were again captured by the *Sheboygan* and *Tuna*.

A sad fatality marked the race in which the *Dixie, Den, White Fox* and *Vesuvius* were competitors. The latter boat had just rounded the stake boat at Two Hundred and Sixth street on the last leg of the legs of the course, when her propeller shaft snapped and the shock and rough water threw Harry Odinet, her engineer, into the river. J. Ferry, the other member of the crew, leaped into the water and made a heroic effort to save his companion, but as both were heavily weighted with their oilskin clothing and rubber boots and had no life preservers on, they sank before help could reach them.

The chief winners of the closing day, Saturday, were the *Dixie, Skedaddle* and *Sparrow*, all of which took prominent places in the preceding events. The *Dixie* beat the *Den* by nearly forty minutes over a 30 3-4-nautical-mile course in the race for boats of 39.37 feet and under. The *Dixie's* time was 1:19:57, maintaining an excellent average for the same course throughout the week. H. R. Sutphen's 50-horsepower cruising boat *Elco* made a splendid showing in the highspeed class for boats of forty feet and over. The 190-horsepower *Skedaddle* was the *Elco's* only opponent, the former being built especially for racing, yet in elapsed time the *Skedaddle* was less than twenty minutes ahead of *Elco* for the full course, and on time allowance she only crawled through a winner by 35 seconds.

C. J. Swain's *Sparrow* won the race for boats of 33 feet and under, making better time by six seconds than the *Skedaddle*. The *Sparrow* has been the biggest prize winner of the week, her victory Saturday giving her possession of the Inter-State Cup for the coming year, while she previously won the long-distance and the reliability races. The *Skedaddle* wins the National trophy, and the *Dixie* takes for the second time the international cup. Only one boat started in each of the cruising class events on Saturday, the *Sheboygan* and *Tuna*, and by running over the course they got the respective points.

Saturday morning the *Standard* made three trials with and against the tide in an effort to beat her mile record earlier in the week, but failed by fractions of a second. Her times with the tide were 2:10 2-5, 2:10 1-5, 2:11 3-5. The times against the tide were 2:33 1-5, 2:34 3-5, 2:34 3-5. Her average for all the trials gave a record of a little less than 25 1-5 knots per hour.

J. H. Hoadley, the owner of the *Den*, has offered the Motor Boat Club a $5,000 cup, open to boats forty feet and under, for a race next year. This cup is to be won outright, and it is hoped that some foreign owners will be attracted by the cup and come here next season to race for it. An official announcement will be made of the offering of this prize, and the conditions governing the racing for it, and all foreign clubs are to be notified.

The carnival closed with a reception on the house boat of the Motor Boat Club of America in the evening.

LOOK BEFORE YOU LEAP—A TIRE TALE.

"Everyone has heard of the man who telegraphs for an automobile expert to come twenty miles and tell him that the reason his motor won't start is that there is no gasoline in the tank," said the automobilist, scratching his nose with the back of a grimy hand, "but I did a thing the other day that was just about as bad, notwithstanding my three years of automobile experience.

"I have had my share of tire trouble, and a little of someone's else, too, I guess, and the other day I blew myself to a pair of non-skids and shook hands with myself on having eliminated most of my puncture trouble at one fell swoop. I put the treads on, inflated the tires and left the car. Fifteen minutes later I came back and one of the tires was flat, though previous to putting on the treads I had not had occasion to pump up that tire for two weeks.

"Well, I was rather stirred up over it, but there was no use making a fuss, so I peeled off my coat again and carefully took off the nice new tread, got out the inner tube and examined it carefully. Nothing doing. Finally I discovered that a little bit of dirt had got into the tire valve and held it open —that was all. I slowly and sadly replaced the tube, heaved the shoe into place, put on the non-skid and perspired over the pump till the tire was again fat and hard. Then I retired to the back yard and kicked myself. You can tell the boys about it if you like—it may save them from similar disgrace; but for goodness' sake don't let on it was me!"

ALCOHOL AS A FUEL IN EXPLOSION MOTORS---I.

By THOMAS L. WHITE.

IN entering upon a review of the properties of alcohol, considered as a fuel for explosion motors, it is well to remember that the engineer's position in the matter is executive rather than judicial. It does not lie in his province to criticise the new fuel and to compare it with existing fuels, merely with the view of advising its adoption or rejection, as he would be called upon to do in passing on a new invention. The case of alcohol vs. petroleum has been settled, largely without consulting him, and the verdict is for the plaintiff. Alcohol has come to stay, not because in this or that particular it is better or worse than gasoline, but because it can be produced anywhere in any quantity from the most diverse substances at a cost which will steadily fall as the demand increases; while its rival is the by-product of a geographically limited and monopolistically controlled industry, liable to rise in price at any time to any extent, and incapable much longer of supplying a world-wide market. This is the basic fact of the *programme économique* and the reason why the engineer's attitude toward alcohol as a fuel has been determined for him.

Alcohol a Definite Compound.

Undenatured alcohol is a definite compound, known to chemists as ethyl alcohol (C_2H_6O). Its composition by weight is, approximately, carbon 52.2, hydrogen 13.0, and oxygen 34.8, and it usually contains water up to 10 per cent. by volume. It is the presence of the last two constituents which depreciates its calorific value compared with gasoline, for neither oxygen nor water can rank as combustibles.

It is characteristic of a definite chemical compound that it has an invariable composition all the world over, and this gives alcohol a standard quality which is lacking in gasoline. Indeed, this latter fuel is a mixture of hydrocarbons whose relative quantities may vary within considerable limits without the consumer being aware of the fact, for the commercial method of grading gasolines by the reading of a hydrometer merely identifies their densities and not their chemical character.

It is important in considering the denaturation of commercial alcohol to remember that the denatured product is not only a possible beverage but an actual fuel. In other words, the denaturizing ingredient should be chosen, not only for its toxic, but also for its calorific qualities. The material generally used at present to render alcohol undrinkable is methyl alcohol (CH_4O), commonly known as wood spirit, which suffers from the disadvantage that its calorific value is rather low, and it would clearly be a gain if some material with a higher calorific value could be substituted. M. Sorel, the French expert, suggests a reduction in the quantity of wood spirit employed, advocating 1 1-2 per cent. of methyl alcohol, containing 25 per cent. of acetone, and 1 1-2 per cent. of crystallizable benzine as a denaturing mixture. He does not, however, raise the question as to how this combination would react when subjected to the temperature experienced in America in the winter time. It seems to the writer that under such conditions the benzine would be precipitated, together with a certain amount of alcohol.

Denatured alcohol has a lower boiling point than pure alcohol, but its latent heat of evaporation, that is to say, the number of heat units necessary to evaporate a given weight, is somewhat greater.

Iron and Aluminum Acted On.

Iron and aluminum are acted on by alcohol, whether pure or denatured, and these materials are therefore unsuited for the construction of tanks, carbureters, or other fuel receptacles, in which the metal surfaces are exposed over long periods to the action of alcohol. Possibly the difficulty can be met by electroplating the surfaces exposed to the alcohol.

Alcohol has certain advantages over gasoline in the matter of storage. If a can of gasoline be left open in the neighborhood of a naked flame, it is liable to cause an explosion, owing to the diffusion of gasoline vapor into the surrounding air in sufficient quantity to form an inflammable mixture. This could never occur with alcohol. Then again, water is useless to quench burning gasoline, only serving to spread the fire by floating the burning liquid. Thus we read every now and again of explosions in city sewers due to the waste gasoline from some garage floating on the surface of the sewage until the vapor from its evaporation becomes ignited. Alcohol can never be dangerous in such a case, for it mixes with water in all proportions, and in doing so becomes inflammable. In very hazardous cases, as in submarines, it is hardly doubtful that the superior safety of alcohol must eventually lead to its exclusive use.

In passing now to consider the properties of denatured alcohol in the carbureter and behind the piston of an explosion motor, it is not always possible to quote exact statistics for the reason that the term "denatured" is far from definitive. For instance, if by denatured alcohol we mean a good standard French *alcool dénaturé*, containing 91 parts by weight of ethyl alcohol, 7 of methyl alcohol and 2 of acetone, we can assign a latent heat of 288 calories per kilogram. For pure alcohol this figure would be 240, and for a denatured alcohol of unspecified composition any number intermediate between 240 and 288 might be the number required. There is here a considerable margin for error, and one which might lead to a serious miscalculation in estimating the minimum working temperature of the carbureter used to vaporize the alcohol in question.

Acetic Acid in Exhaust Gases.

There is one fact, which is true of all alcohol motors, whether the alcohol employed be pure, denatured, or enriched (*carburé*) by the presence of benzine, and that is that the exhaust gases invariably contain more or less acetic acid ($C_2H_4O_2$). If this compound be in excess, so that its characteristic smell is plainly noticeable, pitting of the exhaust valve seat and general erosion of the cylinder wall may be looked for. Happily this is rare except in very badly constructed motors. In ordinary cases, to be safe it is only necessary after a run to inject a little oil into the hot cylinder and give the crankshaft a couple of turns. This protects the cylinder surface against the action of any acetic acid dissolved in water which may be precipitated as the motor cools.

The invariable presence of acetic acid as a combustion product has been attributed to various causes, but there is very little doubt, after the tests conducted by M. Sorel at Paris, in 1902, that it is not any original acidity of the alcohol used, but the formation of acid during combustion which is at the root of the trouble. Were it not so, we should expect the same alcohol used in a number of motors to produce a more or less uniform acidity in the exhaust gases. This is not the case. Then, again, the acidity is specially pronounced in the case of high-speed motors, where the time for carburation is short and where in consequence incomplete combustion is more likely to occur.

When the quantity of acetic acid passing through the exhaust is considerable, sufficient in fact to cause erosion, it is generally accompanied by the deposit on the admission valve of a sticky incrustation. This phenomenon is due to the alcohol being partially atomatized instead of completely vaporized. The small drops on meeting the hot metal are decomposed, their lighter constituents volatilize, and there is left a residuum which adheres.

Clogging of Admission Valve.

Since the clogging of the admission valve is clearly the result of imperfect action of the carbureter, and since in such cases acetic acid is conspicuous in the exhaust gases, it may safely be said that the troubles experienced by users of the alcohol motors have their origin in the carbureter, and this view is borne out by what we know of the chemical behavior of alcohol toward oxygen at high temperatures. Thus, when incompletely vaporized alcohol is burnt in air, aldehyde (C_2H_4O) is formed, and this compound as a rule undergoes a further change, being oxidized to $C_2H_4O_2$ that is, acetic acid. But if the supply of oxygen is insufficient, it is clear that not all of the aldehyde which is formed will be able to undergo further oxidization, and we should consequently expect the exhaust gases of a motor burning incompletely vaporized alcohol in an insufficient supply of air to contain both acetic acid and aldehyde, and this expectation squares with practical tests conducted on running motors.

An ideal carbureter is one in which the fuel is completely vaporized in sufficient air to insure its complete combustion, and to secure these conditions in alcohol motors it has been found by experiment that around 50 per cent. more air must be present than is theoretically called for. In the case of high-speed motors, this excess sometimes reaches as high as 75 per cent., and in heavy motors with perfect carburation it seldom falls below 30 per cent. When the air for combustion is insufficient, the ratio of the carbon, which leaves the motor unburnt, to the total carbon present in the alcohol is very considerable. This is especially noticeable in fast-running, light motors, in which by actual test it has been found that the exhaust gases contained more than 60 per cent. of the carbon of the charge in an unoxidized condition. In heavy motors the consequences of an insufficient supply of air in the charge are not so serious, but even here 30 per cent. of unused gaseous carbon in the exhaust is not uncommon. Other things equal, it is evident that the necessity of an excess of air in alcohol motors tends to increase the size of the admission valve.

Problems in Carburation.

The theoretical amount of air to be introduced at each stroke into the cylinder of an explosion motor does not merely depend upon the chemical composition of the fuel used, but also on its vapor tension and latent heat. For a given amount of combustible it is necessary to calculate the minimum temperature compatible with its complete evaporation, and the amount of heat which must be supplied from an external source to maintain that temperature against latent heat losses. Then, again, the vapor tension of the vaporized fuel and degree of saturation of the resulting explosive mixture must be reckoned, and the rate at which evaporation takes place is also a factor in the problem, for in high-speed motors, the time for carburation may be as short as one-fiftieth of a second. In each or any of these particulars it is clear that alcohol and gasoline may differ very considerably, and that a good carbureter for gasoline might easily be a very bad one for alcohol.

It is a maxim of carbureter design that the explosive mixture must never be saturated at the minimum temperature of the carbureter. This means in practice that the carbureter must be heated and the supply of air increased in the case of a fuel of low volatility, like alcohol.

The minimum temperature for the evaporation of gasoline, if the resulting mixture of air and gasoline is saturated, is about 10 degrees C., and denatured alcohol of the composition given earlier in this article calls for a minimum temperature of 92 degrees C., with the supposition that the air supply is 70 per cent. in excess of the theoretically necessary amount. Nor is this all. Not only must this temperature be *attained* but it must be *maintained*. The latent heat absorbed in the evaporation of alcohol is very considerable, and it must be made good in the carbureter from an external source, such as the hot combustion products from the exhaust.

The influence of considerations connected with the vapor tension of alcohol in determining the operation of the carbureter is too complicated to traverse here. The subject is exhaustively treated by M. Sorel, and readers who wish for further detail would do well to consult the writings of that authority. It suffices now to say that in so far as a comparison of alcohol and gasoline is concerned, the practical conclusion is again that the alcohol carbureter must be heated. And the slow rate of evaporation of alcohol points the same way. Each fuel has its own rate of evaporation for a given temperature, and if alcohol is to evaporize as quickly as gasoline external heat must be supplied.

Efficiency of Alcohol Motors.

It is now clear that the efficiency of alcohol motors depends chemically and physically on maintaining a thorough vaporization of the alcohol and a thorough admixture with a quantity of air in excess of that theoretically called for. To secure perfect vaporization, chemical and thermal considerations lead us to the conclusion that the carbureter of an alcohol motor must be maintained at about 100 degrees C. The temperature and the air supply are more or less complementary quantities, and it has been proposed to attach to the carbureter of stationary alcohol motors an auxiliary air inlet valve governed by the height of the mercury in a thermometer which records the temperature of the carbureter. It will now be apparent that a good gasoline carbureter would probably be a bad alcohol carbureter, while in a good oil carbureter alcohol would work very well. Sufficient has also been said to show why an alcohol motor needs a larger inlet valve than a motor using gasoline.

In a second portion of this article it is proposed to treat the thermodynamic side of the question and to analyze the *pv* diagram of an alcohol motor in some detail.

CORROSION OF STORAGE BATTERY TERMINALS.

Corrosion of the terminals of ignition storage batteries is caused either by acid acting on them and producing an action between the lead and the brass, or, if thick brown paste is formed, the cause is due to an electrolytic action taking place, says the *Motor Car World*, London. When acid moisture is collected to any extent on the top of a sealed storage battery, it will allow the passage of a curent across the top of the cells, from one terminal to the other, the effect of this current being to gradually dissolve the lead and convert it into peroxide of lead in a pasty form. To remove this, the terminals and lead connections should be cleaned with warm water, and then ammonia and water, until they are perfectly clean, and no trace of corrosion or acid remains. All the traces of ammonia should also be cleaned away, and the terminals then anointed with vaseline. To prevent a recurrence of this, the sealing compound all round the terminal lugs should be melted by a hot iron, and all moisture removed as far down as possible. Then clean and keep dry the top of the cells, always endeavoring to prevent anything in the nature of a circuit getting across through moisture, dirt, etc. Corrosion on terminals is not a sign of decay; it sometimes occurs with new cells, and is always a thing to be carefully guarded against and arrested as soon as it is noticed. It is not absolutely preventible, as it is due to natural causes, which only care can counteract.

The autumn season is one of the most delightful for automobiling, but the automobilist should watch carefully to see that the summer's running has not developed weaknesses or defects that may crop up when the car is far from home. A close scrutiny should be maintained at all times, of course, but more especially after a season's running.

STORIES TOLD BY THE GARAGE MANAGER

ON Monday morning the garage manager was in a savage mood. So, apparently, was the stout man who had just walked out of the garage office with a face like a thundercloud. His last remark had been that he couldn't understand how it was that a man who was supposed to be in charge of a garage would let a car go out in *such* a condition; what good was a garage manager, anyway, if he couldn't see what was going on under his nose; and so on. And it took the garage manager some time to cool down to an ordinary working temperature.

"After all," he said, "I don't know that I blame him so much, for he doesn't know what to do except pitch into me, and in a way it was my own fault.

"You see it was like this. Major Jones is an obstinate sort of man, but still he is rather easily imposed upon. He doesn't know the first thing about a car except what it cost him to buy it. As nearly as I can figure it out, he advertised for a chauffeur, and when a good-looking chap comes up, says he knows all about the Major's make of car, and backs up his statement by running the car around and doing a few slap-dash stunts that look mighty fine to an inexperienced eye, the Major jumped at the chance of getting such a jewel at the very reasonable figure he demanded. So Mr. Chuaffeur gets a real nice job, and, being a smart chap along certain lines, he soon makes himself solid with his boss. By chance, however, I got the young gentleman's history, and found that though he wasn't exactly crooked, he wasn't a chauffeur at all except that he was able to drive a car. He didn't know how to handle tools and was profoundly ignorant of the vitals of the car he drove.

"I suspect that the Major had been asking him some awkward questions about the machine; at any rate, the chauffeur suddenly exhibited a fondness for taking off the bonnet and rubbering around the motor. This was all right, and he needed the information; but I felt rather doubtful when he came to me one day and said he wanted some sheet asbestos to make a gasket for an exhaust pipe joint. Up to this time he had always told me when anything was wrong, and I had one of our own men make it right. But I gave him the asbestos and the thing went out of my head entirely for the time.

"Next day—that was yesterday—Major Jones telephoned to have the car at the curb in front of the garage, as he wanted to take out a party of friends and would pick up the car at the garage. As bad luck would have it, the men pushed the car into the street without starting the motor, and the chauffeur busied himself making the car look smart. And pretty soon along comes the Major and Mrs. Jones, and a friend and his wife. The Major got up beside the chauffeur's seat and the other three climbed into the tonneau.

"'All right, Brown,' says he, with a lordly nod to the chauffeur.

"Young Brown grabs the handle and swings her over a couple of times and away she starts; but there wasn't any ginger in the thing and I mistrusted that something was wrong. She ran steadily enough, however, and Brown let her run while the ladies were arranging themselves and their lap-robes. In a minute or two a little stream of smoke began to ooze out from under the bonnet and was wafted toward the Major's sensitive nose.

"'Brown, what's burning?' says he.

"Brown lifted the bonnet and found that a big wad of waste that he had put on the exhaust pipe *to keep his hands clean* when he was putting on the gasket was very naturally smoking to beat the band, and the Major, who detests unpleasant odors, was annoyed. It didn't look nice, either, just when he wanted things to pass off smoothly and with dignity. But Brown pulled off the waste, put down the hood and climbed into his seat.

"Then the real fun began. Brown opened up his throttle a little and started to let in his clutch; but the motor didn't pick up with its usual vim, and when Brown, in his usual dashing way, got the high speed in and was just settling himself down to make a grandstand dash away from the curb and nearly dislocate the necks of the passengers, the motor suddenly died when the car was in the middle of the road, diagonally across, blocking the narrow street. There were half a dozen people watching, of course. Brown got out and gave her the crank, and off she went. This time he was more cautious with his gears, but the motor didn't seem to be doing anything much, and before he got out of sight I saw Brown get out again and do the crank act.

"Half an hour later the car came back on second speed, the engine just keeping going, and the passengers were nowhere to be seen. Brown looked horribly worried, and came and told me that he had cranked the blamed thing four times within four blocks, and finally stopped right in the middle of a trolley track. The Major and his friends got out and Brown was ordered to take the car to the garage. Of course I thought of the gasket right away, and I asked Brown if he had cut out the opening for the exhaust to pass through, and if he had been careful to keep the pieces out of the pipe.

"Then it all came out. Brown didn't know that there was anything inside the muffler, and let his scraps of asbestos and the pieces of two spoiled gaskets drop down the pipe. I had the muffler taken off and found it choked up with scraps of asbestos of all sizes, and it was a wonder the engine would run the car at all with all the back pressure she was working against. And poor Brown thought the pieces would just blow out when the engine was started. The Major called this morning and he was howling mad—as you could see for yourself.

"There are a good many morals to the story. One is that a man shouldn't attempt a job unless he knows how to do it. Another is that a man shouldn't hire a chauffeur on the strength of a few flashy stunts and then let him learn mechanics at the expense of a good car. Another is that a garage manager should see everything and be everywhere at the same time and should be a mind reader. Otherwise he can't expect to please everyone and keep his job.

"The Major blames me more than the chauffeur because he is, as I said, obstinate, and he won't admit that the man *he* selected to drive his car is a know-nothing. Just the same, I'm glad I'm not in Brown's shoes."

The garage manager chewed reflectively on the end of a pencil and gazed out into the garage through the window in the partition. And while he was looking, Brown came in with a grip, took his things out of his locker, and departed unostentatiously.

Trees as Substitutes for Brakes.

There is nothing like resourcefulness when a man is on the road and can't get within call of a repair shop if anything goes wrong. The country blacksmith shop is a friend in need when it can be reached, but even blacksmith shops are not found everywhere. A touring man brought this out very strongly on his return from a trip through a hilly country where repair facilities were scarce.

"There were only two of us," he said, "and we roughed it a good deal, being old campers. Many a night we slept under the stars, and enjoyed it, too. But one day, just as the sun

was going down, we found ourselves half way down a mountain with the hub brakes out of business, owing to the terribly hard work they had done, and the foot brake of no use on anything like a real grade. There was a descent of about four miles with scarcely a level spot and many of the grades were somewhere about sixteen per cent. And on top of it all a big black brute of a storm was slowly gathering. It was a case of get down into the valley, where there was shelter, or take the storm. We preferred the valley that night, and tried a desperate plan. We cut down two small trees and lashed the butts securely to the rear axle, one on each side of the differential. Then we got a short pole, a little longer than the width of the car, and lashed it across from one rear spring to the other, on the under sides of the springs behind the axle, so that it pressed down hard on the trees. It wasn't as easy as it sounds, and it must have been mighty hard on the springs, but we took the chance.

"We started. The first part of the declivity was not very steep, and we had to help her along a little with the engine. But we got some confidence when we found that the drag held us back pretty hard. Before starting down the first real hill we got out and looked well to our fastenings, and let her go.

"After the car got a start on the steep pitch the trees didn't seem to count so much, and it was only by a dangerously vigorous use of the weakened foot brake that we got down safely. But we managed to come to a stop on a slight grade and shifted the pole so as to press harder on the trees, and down we went, this time straight into the valley. We got through all right, and though we got caught in the rain and well soaked, we were soon under cover and dry without and wet within—a sight better than roosting on the mountain over night in the rain and cold.

An Experience with Kerosene.

"On the same trip we had an interesting experience with our fuel supply. Before entering a region where we expected to find no gasoline, we stopped at a village and inquired for juice. To our horror, we couldn't find any, and we hadn't enough in the tank to take us back to the nearest base of supplies. Rather than wait to send a wagon back—and objecting very much to such an undignified proceeding—we took along a couple of gallons of kerosene and started out. As we expected, the next hamlet was innocent of gasoline, so we started by putting a quantity of kerosene into the gasoline tank with the gasoline. The engine took it all right, smoking a little, but by giving it more air the smoking was entirely stopped. But as the fuel supply decreased we kept adding kerosene, and she began to smoke horribly and we couldn't prevent it. I haven't any idea what proportions of gasoline and kerosene we had, but anyway we had to stop and clean the plugs every few miles, and we left an odorous trail that would have made a pole-cat blush. The main point, however, was that we were enabled to travel about twice as far as we could have gone if we had not brought along the kerosene, and we struck gasoline just about the time the plug-cleaning business became an almost continuous performance. I think that another time I should waive dignity and send a horse for more gasoline; but we learned what could be done in case of emergency. If we had started on the kerosene earlier doubtless we would have had less trouble toward the end.

The Latest Thing in Valve Springs.

"One of our exhaust valve springs was made of miserable stuff and it broke. We fixed it up by putting a washer between the ends where the break occurred, but the blamed thing broke again and this time we couldn't do anything with it. There was a blacksmith shop handy, but the blacksmith hadn't anything we could make a proper spring out of. The idea of running on three cylinders was not attractive, and we finally got out of it by using a flat spring. The blacksmith had some fairly decent flat steel that answered the purpose. A piece of this flat steel was drilled at one end and the opposite end filed out to a forked shape. The drilled end was securely held by a bolt in one of the exhaust pipe joints, and the fork in the opposite end straddled the valve stem and pressed down on a washer slipped over the stem and held in place by the cotter in the stem. After a good many trials we got the spring adjusted to something approximating the tension of the others and, starting up the engine, found it ran very well indeed. Later we found that the spring was rather sluggish, and it got worse as it ran longer; but we used it throughout one day, and evening brought us to a place where we got what we needed."

AUTOS IN MEXICAN MAIL SERVICE.

Consul-General A. L. M. Gottschalk, City of Mexico, sends a report on improvement in Mexican mail system, from which the following points are taken:

A marked improvement has been obvious of late in the postal facilities offered the public in the City of Mexico. Collection of mails from Mexico City letter boxes takes place every forty-five minutes, and there is a general sending out of letters from the postal substations through the city every hour and a half. A city letter thereby comes into the addressee's hands only a little over two hours after actual mailing. A noteworthy feature is that all letters on being issued bear upon the envelope the name and official number of the postman to whom they have been intrusted for delivery.

Until recently mail wagons of ordinary type drawn by horses or mules were used. These are likely to be supplanted by automobiles. A large vehicle of this description with three tons capacity has been purchased and will be put into use. This purchase is likely to be followed by others of similar character, the roads of the City of Mexico being well adapted to the use of motor cars. The consul-general suggests that American manufacturers of automobiles of the mail-delivery type would do well to communicate with the postmaster-general, whose address is "Direccion General de Correos, Mexico, D. F. Mexico."

ITALY NEEDS LIGHT AMERICAN CARS.

Consul Paul Nash reports from Venice that the mountainous regions of central and northern Italy are becoming more and more important as summer resorts, and, although the hotels are being rapidly modernized, the vehicles which one must take to reach them remain the same heavy, lumbering barouches or distorted victorias of a half century ago. Mr. Nash continues:

It has often struck me that our buckboards would meet with great success in these regions, as well as in the Austrian Tyrol and Switzerland, were they once properly introduced. The cost, even considering the transportation and duties, would be much less than that of a vehicle of corresponding capacity of the kind now in use here, and the lightness would result in a great economy in horseflesh.

I believe that an enterprising firm, with agents operating from a series of depots, would build up a good business in a comparatively short time, and hence strongly advise any manufacturer of buckboards who desires to extend his trade in this direction to give the matter his careful consideration. No sales are likely to be made by means of catalogues; it is absolutely necessary to place the sample directly before the people in order to induce them to buy.

A 35-horsepower car is now in active service at the Grand Hospice on the top of Mount St. Bernard in the Alps. The first successful run was made from the valley the last week in August, when a party of monks in their time-honored cossacks and cowls drove and attended the vehicle, which was loaded with supplies for the monastery.

LETTERS INTERESTING AND INSTRUCTIVE.

Statements as to Power Output.

Editor THE AUTOMOBILE:

[406.]—In looking around the different show rooms, I notice that there are several cars on the market the cylinders of which are cylindrical in form—having no offsets for the valves located in the heads. The manufacturers of these claim that the compression chamber, being more compact and symmetrical, the charge is more quickly and more thoroughly burned, resulting in a more economical consumption of gas and greater power than from motors with cylinders of equal size, but with offset valve chambers. This would seem reasonable, but as there is at least one manufacturer who has discarded this method, and as the majority of motors still present the valve offsets, it would seem that the advantages of the former construction might be offset by still greater advantages of the latter. I know of one maker who claims, and who is willing to back his claim by a sworn statement, fifty horsepower (electrical test) for a motor with cylinders whose diameter is but 4 5-8 inches, which if true is certainly greatly in excess of any other motor of equal size. Any light you might throw on the subject through the columns of THE AUTOMOBILE would be much appreciated. H. E. BISHOP.

Norwalk, Conn.

The original theory of eliminating offsets was that distortion, due to the separation of the unequal temperatures of the exhaust and inlet valves, would be thus avoided, and that the inlet valve would help to cool the exhaust. It now seems proved, however, that there is little distortion of this sort, because of the rapid conduction of the heat through the mass of cylinder metal, while cooling the exhaust valve by the incoming charges involves heating these charges, which is decidedly objectionable because of the consequent reduction in their volume. The claim of the maker you refer to, to the effect that a four-cylinder engine of 4 5-8-inch bore, by a stroke presumably not greater than 5 inches develops 50 horsepower, is similar to the sworn statement of another maker, of a two-cylinder opposed engine, 4 1-2-inch bore by 5-inch stroke, which is asserted to give 29 horsepower—equal to 58 horsepower for four cylinders. Incidently, the latter engine has offset valve chambers. The case you cite has the least appearance of straining the truth, so let us analyze it. Taking a rotative speed of 1,200 revolutions to the minute, which is certainly as high as would be approved by any good engineer, since it means a piston speed of 1,000 feet a minute, we have 2,400 working strokes to the minute. With this number of strokes, a brake test showing 50 horsepower would imply a mean-effective-pressure, throughout each working stroke, of 98 pounds to the square inch. This, in turn, would require an *actual* mean-effective-pressure of at least 122 pounds to the square inch within the cylinders, to develop as much as 50 horsepower. What this claim amounts to, you can judge for yourself from the fact that the most efficient of the great scavenging gas engines used in stationary practice, which give much better results than ever have been attained with liquid-fuel engines, do in no case give higher mean effective pressures than 110 pounds to the square inch. The Diesel engine, noted for its efficiency, never has been shown to give higher than 95 pounds to the square inch, mean-effective-pressure. One of the foremost American cars, fitted with an excellently designed engine of French manufacture, only claims 24 horsepower with the same stroke and bore as you refer to, and it is noted for its ability to go as fast on the road as any other car made, which is provided with an engine of the same stroke and bore. Practical results always are better than theory, and the fact that the foremost manufacturers here and abroad do not seem to lay particular stress on the compact combustion chamber proves that its theoretical efficiency, though it undoubtedly exists, is scarcely measureable practically. At exceedingly high rotative speeds—away above what is practical or desirable—it is remotely possible that during a very brief test the 50 horsepower you refer to might be developed, but such a result would be absolutely unattainable in anything but a laboratory test, and would call for a hopelessly strenuous piston speed.

Two Questions of Design.

Editor THE AUTOMOBILE:

[407.]—How much will a cylinder stand to be bored out and use the same piston? By putting new rings on? And in an opposed engine, if the connecting rod for one piston is heavier than for the other, would it cause pounding, and should the rods be evened up in weight? J. W. NASH.

Arrow, Me.

A cylinder will stand only an exceedingly small amount of reboring without necessitating a new piston. A piston should fit to within a two-hundredth of an inch of the cylinder walls, because if it is any looser the thrust occasioned by the angularity of the connecting rod will set up a destructive pound. Of course, if only a slight reboring is attempted, a fairly good makeshift job can be had by refitting new rings an dletting the piston remain as it is. In regard to your question about the unbalanced connecting rod, this question is thoroughly answered by the fact that many single-cylinder engines, of ordinary construction, work without pounding when in good order. The vibration due to one connecting rod being heavier than the other would be in amount proportionate only to the *difference* in weight. The fact, however, that whatever vibration did occur would affect the greater mass of both cylinders, both pistons, both connecting rods, etc., might offset the fact that it was small in amount. And in any case there is no particular reason why connecting rods should not balance exactly, while there are many good reasons why they should not be out of balance.

Bent versus Forged Crankshafts.

Editor THE AUTOMOBILE:

[408.]—Why is it that crankshafts of four-cylinder engines, drop-forged out of solid steel billets, are preferred to crankshafts bent out of a piece of rod or square stock? It would seem to me that the latter plan of manufacture would be the least expensive, and at the same time much superior to the other, since it would tend to lay the fibres of the steel around the corners in the finished shaft, in such a way as to lessen rather than to increase the danger of breakage. With steel having the marked fibrous structure that is so characteristic of some of the best alloy steels, why would not the plan of machining a crankshaft out of a flat forging be much the same as cutting a similar member of wood out of a board, in preference to steaming and bending, to carry the analogy out? CHARLES H. TOWNSEND.

Elmira, N. Y.

It is an open question as to which of the two methods is the better. In respect to manufacturing cost, it is doubtful whether bending would save much, since its application is certain to produce some rather peculiar cross sections, only to be eliminated by machining. And as for the fibrous character of the steel, it is not so marked in most steels used for crankshafts as you assume and as it is in steels used for other purposes. At this time, it would be difficult to predict which of the two methods, if either, becomes the final one. Both are good, under proper conditions.

Starting a Two-cycle Boat Engine.

Editor THE AUTOMOBILE:

[409.]—Will you please tell me the proper way to start a two-cycle engine? I have a small single cylinder, two-cycle engine in a boat, and in attempting to crank it in the usuel manner, it often evinces a very contrary tendency in the way of running towards the opposite direction from that in which it is intended to start it.

Turn the engine one or two complete revolutions in either direction, with the ignition shut off, simply to insure the aspiration of a proper fuel charge. Then turn the engine in the opposite direction from that in which it is to run, rocking the flywheel until the piston reaches the top of its stroke. In this way you will get a back kick, so to speak, which will start it revolving the right way. This is the method usually adopted in starting engines of

the type you speak of, although ordinary cranking works very well if all the conditions are right. Such engines as you refer to usually are without ignition retardation or advance, the spark always occurring exactly on the upper dead center, so that the engine will run equally well in either direction. Therefore, when the end of the compression stroke is reached, ignition takes place, and the engine starts in whichever direction it comes off the dead center the easier. And in rocking the flywheel as described there is the natural tendency for an oscillation backward, reversing the direction, which acts rather more markedly than the tendency to continue rotation as in the case of the normal starting of a four-cycle engine.

Starting on "Compression."

Editor THE AUTOMOBILE:

[410.]—Despite the widely-advertised and well-known fact that many engines are self-starting on the compression, a friend of mine insists that no cylinder will hold its compression to any material extent for more than a few moments after it is stopped. I am not able to bring to bear any argument that is convincing, and would like to have your statement of the case.

JOHN R. FOLEY.

Center Point, Ark.

It is a fact that no engine will retain compression for more than a very few minutes after it is stopped. The condition is that mixture, at practically atmospheric pressure, is retained, and it is only a well-made engine that will even do this for a few days, during which time it will be self-starting upon the manipulation of the ignition, provided the fuel is not condensed out of the air by cold weather or other causes. It is manifestly impossible that the contact, even the close contact of two oiled surfaces, not especially pressed together, should hold gases at high pressure without rapid leakage. What really occurs is that the cylinder retains mixture at practically atmospheric pressure. Mixtures fired at atmospheric pressures do not, of course, give as strong impulses as compressed mixtures, but do give enough impulse to start the engine without load. The fact that there is little or no compression held in the ordinary automobile engine can be proved by opening the relief cocks of the cylinders within a minute after the engine has stopped. A very slight puff, due to a compression that is a matter of ounces rather than of pounds, will be all that is perceived. Also, the fact that any engine can be cranked very slowly without great effort shows that there is a fairly rapid leakage of the gases between the piston and the cylinder wall, except at high speeds.

A Peculiar Ignition Trouble.

Editor THE AUTOMOBILE:

[411.]—I have a powerful car of a well-known foreign make that is subject at times to a most mystifying irregularity in the operation of the engine. When the bonnet is down and the car is running along the road, every once in a while one of the cylinders will miss an explosion—just frequently enough so that it can be detected by an ear familiar with the car. In the shop with the bonnet up there is absolutely nothing wrong and the engine runs perfectly, but the moment the bonnet is put down the missed explosion occurs occasionally. I have tested the carbureter, the ignition circuits, and everything else, but am totally unable to ascertain the trouble. If you can help me out, I will very much appreciate it.

H. MEISE.

Lancaster, Ky.

A process of elimination alone, if nothing else, seems to argue that ignition troubles certainly are what cause the difficulty. Even with make-and-break ignition, in which the current is of low tension, and therefore not especially likely to short circuit, there is a possibility of worn insulation on the wires, either where they come in contact with the bonnet, or else where the bonnet or something that it comes in contact with presses down upon them. A careful search along the lines of these suggestions undoubtedly will lead to a cure, but care must be taken to isolate the wires in tracing the difficulty. The quickest way out of the matter would be to try a new set of wires, which will, in all probability, eliminate the trouble.

Babbitt or Bronze for Plain Bearings.

Editor THE AUTOMOBILE:

[412.]—I notice that a well-known new runabout has babbitt-metal bearings on the engine crankshaft, and I would like to know if this is good construction at this point. Should not these bearings, at least, be of brass or of bronze, to withstand the heavy wear without too-rapid loosening? Just what are the respective merits of bronze and of babbitt for bearings? Also, is it not a fact that babbitt bearings often are used because it is easy to make them cheaply by simply casting the metal around the shaft?

WM. A. DECKER.

Philadelphia, Pa.

A good babbitt bearing is a better bearing than most people think. Some of the very best automobiles made have babbitted mainshafts, connecting-rod bearings, etc., applied under circumstances in which expense certainly is not an object. Babbitt is considered a better anti-friction metal than bronze, and it is generally a fact that a shaft will run smoother in it. Even many of the best bronze and brass bearings have holes and grooves in the bearing surfaces, which are filled with babbitt, so as to combine its advantages with those of the harder metal. One advantage of a babbitt bearing is that if the lubrication fails from neglect or otherwise the bearings will simply melt out and render the car inoperative, under conditions making repair not seriously expensive. A bronze bearing or a brass bearing, run dry, will freeze upon and rapidly wear the steel shaft journal, which is most expensive to replace or refit. The greater hardness of bronze and brass constitutes their chief superiority to babbitt, and accounts for the undoubted fact that when properly cared for they do wear slower and thus require less frequent refitting.

The Passing of the Spark Gap.

Editor THE AUTOMOBILE:

[413.]—I read Mr. Bauer's query regarding the use of the spark gap and would say that while it is not in use nearly so much as formerly, yet it has by no means wholly passed from use. Most of the high tension distributers now on the market incorporate it into their designs, as in these the revolving member seldom makes contact with the fixed segments. Furthermore, it is used a good deal by testers at factories when in trying out a new engine it is desirable to use lubricating oil somewhat liberally.

However, it is not so much in use as formerly, owing to the fact that improvements in ignition devices, carbureters and lubricators have rendered it almost unnecessary, except in a few special cases. Probably the introduction of the modern soot-proof type of plug which has an annular air space between the insulator and the plug casing, is the principal reason for the passing of the spark gap. With the old type of plug a motor would be stopped by a thin coating of soot, which could easily be wiped off the porcelain with a pocket handkerchief. With the modern type of plug, however, a cylinder will still keep on working with the soot actually caked on the porcelain. Then the danger of fouling by excessive lubrication is largely overcome by placing the spark plugs vertical and in protected positions, and also by improved lubrication devices.

Since, therefore, the necessity of the device has largely passed, its use has greatly declined. HAROLD H. BROWN.

Boston.

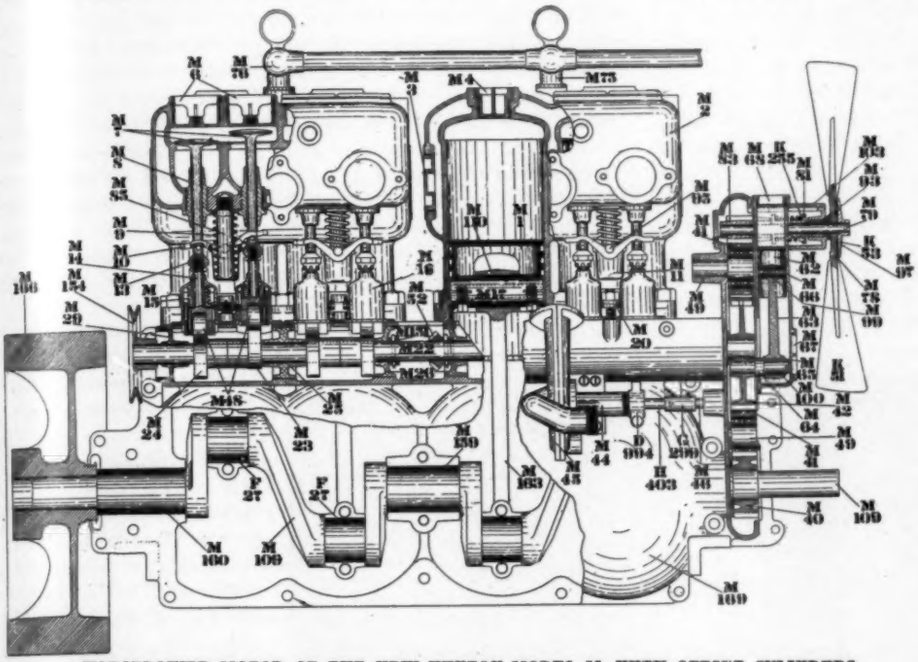
TARRED ROADS IN ENGLAND.

Consul Albert Halstead forwards an article from Birmingham, England, regarding the hygienic value of tarred roads. Road painting with tar is described as follows:

"The road is first thoroughly cleaned by dry sweeping, then roughly distilled tar is poured over it and spread evenly, after which sand is thrown on and the road is immediately ready for traffic. A fortnight or three weeks later a second coating is applied and in a short time the road has the appearance of an asphalt street. It appears, also, that a short stretch of road in Beckenham was treated with tar oil, which is poured over again until the pores of the road exude the preparation. This tar oil, however, dries up quickly, does not make an oily and nasty mess in wet weather and is said to be much cheaper than the tar process, but it requires more frequent renewal. A comparatively small quantity of the material is available, and this is a difficulty in the way of its general adoption."

DETAILS OF THE 1907 WINTON MODEL M

THERE is much that is interesting in the design of the New Winton Model M 40-horsepower car, which differs in many essential features from previous cars built by this concern. The line drawings herewith give a good idea of the details of the engine, clutch and transmission mechanism, and the explanation with reference numbers will give the reader a good idea of the working of the mechanism. A general description of the machine was given in THE AUTOMOBILE of September 6, but the details here given were lacking.

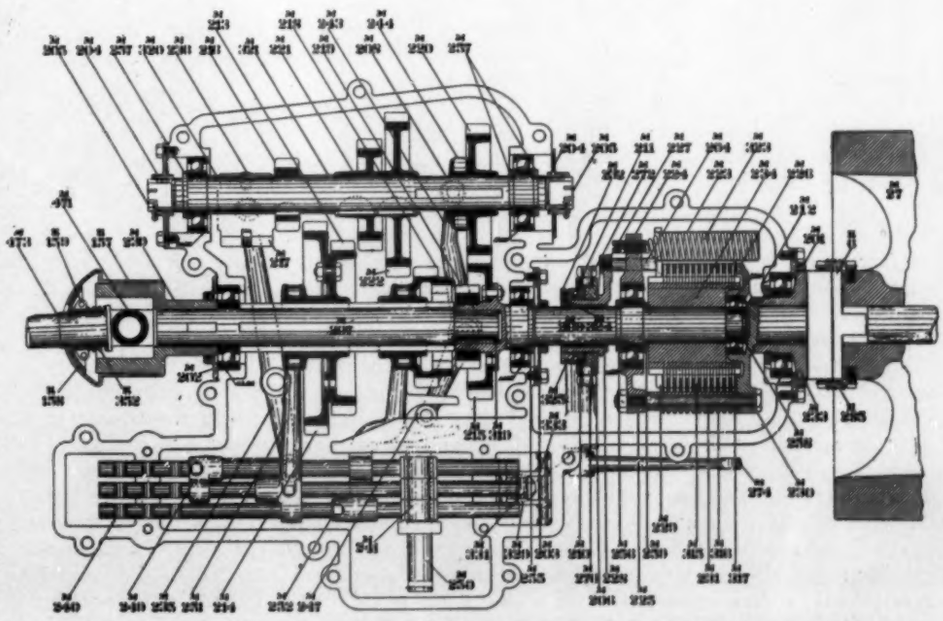


40-HORSEPOWER MOTOR OF THE NEW WINTON MODEL M, WITH OFFSET CYLINDERS.

Cylinders are cast in pairs and have the valves placed all on one side of the motor and operated by a single camshaft (M 22). The cylinders are offset from the center line of the crankshaft for the purpose of equalizing the piston thrust and wear on the cylinders, and also so that the impulse on the piston will act more directly on the crank-pin. But one spring is used to operate the inlet and exhaust valve of each cylinder. In the end of each valve stem is placed a pin; a yoke (M 10) fits over the pins of the inlet and exhaust valves for each cylinder. This yoke has a projecting lip at the opposite ends of each pin, to prevent the pin from slipping out. In the center of the yoke is placed a trunnion ring (M 95), and in this trunnion ring is a steel thimble which carries the spring pressure. Screwed into the cylinder, and passing inside of the spring, is a steel pin (M 85), which serves the purpose of maintaining the alignment of the spring.

The camshaft and its bearings (M 25-29, etc.) form a unit; the spaces between the bearings are taken up by the cams, excepting in the center, where we find (M 52) the bevel pinion for operating the timer, and in this case a collar (M 151) and the gear are pinned to the camshaft. The camshaft bearings are larger in diameter than the cams, so that to withdraw the camshaft it is only necessary to loosen the pin holding the bearings in their places and withdraw the cams. The usual plunger and roller are used to communicate the cam motion to the valve. Inside of the plunger guide is a spring for keeping the roller always on the cam. The camshaft center is offset from the line of the valves to reduce the thrust on the plunger guides for the same reason that the cylinders are offset from the crankshaft. The camshaft is carried in a separate case and lubricated from the throw of the connecting rods. The plunger guides (M 16) are held down by a yoke which is clamped by an arm (M 20) by means of a nut placed over it. The removal of this one nut permits the removal of the plunger, guide, roller, and all of these parts for one cylinder, without disturbing the valves, springs, or their parts. By removing the pin in the end of each valve stem the valve can be removed through the plug placed over it, the yoke (M 10) dropping down onto the nut (M 13) on the plunger. This does not disturb the plungers or parts, nor does it require the removal of the spring. At the forward end of the case are housed the gears which drive the camshaft, idlers, water pump, air pump and the fan.

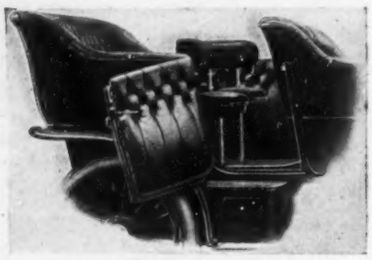
The idler for the camshaft and for the fan are mounted on annular ball bearings; the fan is gear driven. The air pump is to supply air pressure to force gasoline from the rear tank to the carbureter, and oil from the oil tank to the lubricator on the dash. The air pump is driven by a pin in the camshaft



FOUR-SPEED SELECTIVE SLIDING-GEAR TRANSMISSION OF MODEL M WINTON.

gear. The water pump is of the familiar centrifugal type. The vertically split crankcase construction is maintained, the detachable side being on the left and having two inspection covers.

The transmission gear and clutch are in one aluminum casting, the two chambers being separated with felt packing between. The clutch is of the multiple disk type. The transmission and clutch are mounted on annular ball bearings. The clutch consists of two spiders (M 226 and M 225), connected by six bolts (M 230), which are surrounded by six spacer tubes, as shown in lower half of the clutch. One half of the disks have six lugs which fit loosely over these six spacer tubes, and as the spider (M 226) is directly connected to the Oldham coupling between itself and the flywheel, these outer disks are in motion all the time the engine is in operation. Between each of these disks is placed another disk, small enough in diameter so that it comes inside of the spacer tubes referred to, and on its inner portion has four radially projecting tongues, which fit into four corresponding key seats cut in the steel casting (M 234), which is keyed to the shaft (M 209). As long as no pressure is applied to these disks, the outer disks can rotate without transmitting motion to the inner disks on the shaft (M 209), which rotates the transmission gearing. Six spiral springs are spaced equidistant around the outside of the clutch with their axes parallel to the axis of the clutch. They are carried on steel thimbles, which are carried by a plate (M 229), which forces the disks together against the spider (M 226). The spring carrier plate (M 229) is withdrawn toward the transmission to relieve the spring pressure. This motion is obtained by three pins (M 264) passing through the spider (M 225) and attached to another spider (M 227). This last spider rotates freely on the shaft (M 209), and by means of a fork and through the medium of a ball thrust bearing (M 211) and the lever (M 274) on the yoke shaft, withdraws the spring pressure when moved away from the clutch.

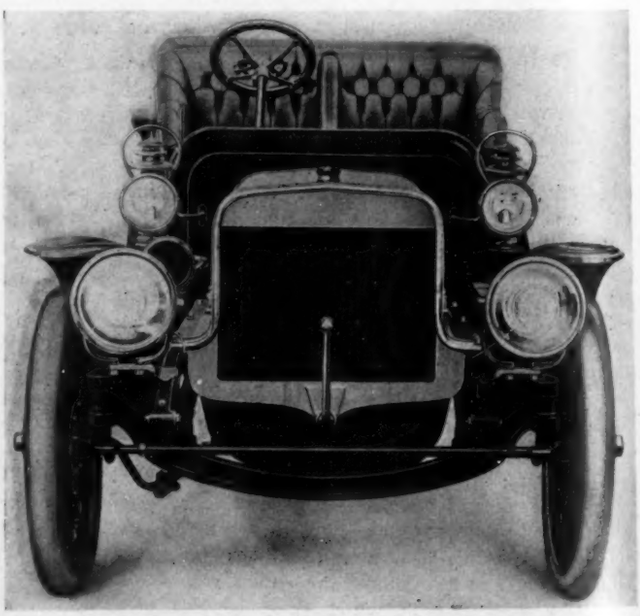


WINTON AUXILIARY SEATS.

The gear changes are obtained by means of three shifter rods. The reverse idler (M 217) is not in mesh with other gears except when in use. To engage the reverse, the inner rod is moved to the left, which, through the lever (M 235) moves the reverse idler (M 217) to the right until it engages both the pinion on the countershaft (M 216) and the gear on the main shaft (M 214), the other gears remaining as shown. First and second speeds are obtained by shifting the double gear (M 214, M 213), by operating the center shifting rod. When this is moved to the left, the pinion (M 216) on the countershaft engages the gear (M 214) on the main shaft. This double gear is attached to the shaft (M 207) by means of four milled keys in the latter, so that it can slide on the shaft but must rotate with it. When the center shifting rod is moved to the right it engages the pinion (M 221) with the gear (M 213), giving the second speed forward. The countershaft is driven through all the changes so far by means of the gear (M 215) which is directly connected to the clutch shaft (M 209), meshing with the gear (M 220) on the countershaft. The other countershaft gears (M 216, M 221 and M 222) are keyed to the countershaft and do not shift longitudinally. This gear (M 220) fits on milled keys integral with the countershaft, so that it has a motion along the countershaft.

Third and fourth speeds are obtained by moving the outer shifting rod. When moved to the right, the external-internal gear (M 218) comes into engagement with the pinion (M 219), which, through keys, is also direct connected to the clutch shaft (M 209), which gives a direct drive from the flywheel through the clutch, and, by attaching the clutch shaft (M 209) to the transmission main shaft (M 207) gives the direct drive through to the propeller shaft (M 473). A second action takes place at this time, which shifts the countershaft gear (M 220) to the left, so that it is not in mesh with the clutch shaft gear (M 215). This is obtained by having a pivoted lever (M 243), one end of which shifts the gear (M 220) and the other end has a roller which acts in a cam plate integral with the arm that shifts the external-internal gear (M 218). As the lever (M 252) is moved to the right by means of the outside shifting rod, the cam roller drops into the circular portion of the cam plate, moving the gear (M 220) on the countershaft out of mesh with M 215. It will be noticed that upon this, the third speed, the countershaft is stationary, and none of the gears in the case are in mesh and rotating. This gives the direct drive. The fourth speed is indirect; that is, the countershaft is in use on the fourth speed. It is obtained by moving the outside shifting rod to the left from the position shown on the cut until the external gear on the external-internal combination (M 218) is in mesh with the countershaft gear (M 222).

Transmission gears are all of nickel-steel, hardened, with teeth rounded to make engagement easy. The left ends of the shifter rods have three parallel slots milled in them, and over the center row are placed three steel balls, which have springs to force them into the slots of each of the rods. Thus there is a tendency for the gear combination to jar in or out. The principal use of these balls and notches is so that the operator can feel the ball drop in and know when the gear combination is properly engaged. Near the right end of these three rods each has a block (M 241), and these blocks have a slot on their upper surface, so that the outside hand lever can slide a finger from one block clear across to the other block when all are in the neutral position. The blocks have milled on their under side a segment of a circle, into which fits a round pin (M 250), which is suitably supported, and which moves in unison with the finger attached to the hand lever, which operates whichever block it is desired to move. Directly under this finger on the pin (M 250) is milled a slot sufficiently wide and deep so as to permit the shifting block on the shifting rod to be moved to the right or left over it. This slot in the pin is always under the shifting finger attached to the hand lever, and the only block which can be moved is the one directly over the slot in the pin, the other two remaining positively locked.



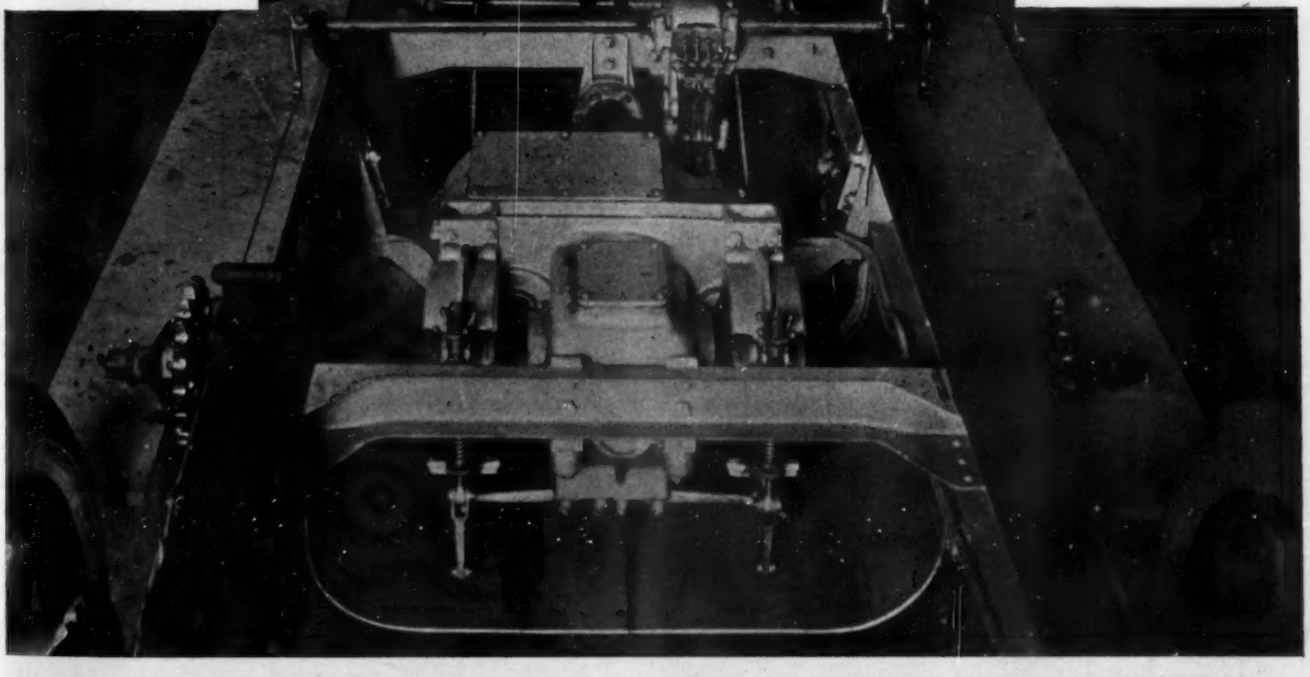
FRONT VIEW OF WINTON MODEL M TOURING CAR

A FRENCH CAR OF AMERICAN PARENTAGE

IT is a rather curious fact that the car illustrated and described here is manufactured in France by the French branch of a prominent American concern, and is imported into this country on exactly the same footing as any other car built in France. The owner of a Westinghouse car, built in Le Havre, France, by the Société Anonyme Westinghouse, a branch of the well-known Westinghouse Electric & Manufacturing Company, can doubtless follow his own inclinations as to whether he calls his car an American or a French machine. However that may be, the car shows itself, in actual operation, to be one that neither American nor Frenchman need be ashamed of.

There are no startling novelties embodied in the construction of the 1907 Westinghouse car. Every feature is of known value, and experimental forms of construction are tabooed. But one style of chassis is built, and this is supplied without body, so that the purchaser can, in the customary foreign way—a way that is fast gaining favor in this country—have a body built to suit his own individual requirements. The wheelbase is long—122 inches—and the tread the usual standard. Front wheels are 915 by 105 millimeters, and rear wheels 935 by 135 millimeters, in the foreign fashion of measurement. Here we would say the front wheels are 36 inches with 4-inch tires, and the rear wheels 36 inches with 5-inch tires. Tires have the flat treads that are becoming so popular. Chassis weighs about 2,800 pounds as delivered to the body-builder, the weight complete depending on the weight of the body. Motive power in abundance is supplied by the 40-horsepower motor, and the power is transmitted through a multiple disk clutch, four-speed and reverse transmission of the selective type, countershaft and side chains to sprockets on the rear wheels. In common with all high-class foreign cars, the Westinghouse car is fitted with large sprockets, and this feature has a marked influence on the wear of the chains. A chain that has to pass around a small sprocket will wear faster than when a large sprocket is used, because the angles between the links are greater and the wear on the joints is correspondingly increased. Large sprockets are also conducive to quiet running.

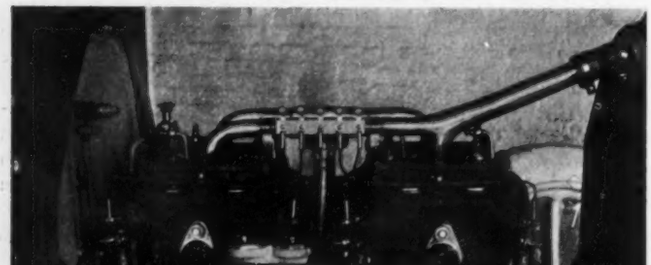
Cylinders are cast in pairs, with heads, water jackets and valve chambers integral; the bore is 120 millimeters and the stroke 140 millimeters, or 4 3-4 by 5 1-4 inches. All the valves are mechanically operated and of the same size; the inlet valves are placed on the right-hand side and the exhaust valves on the left, two camshafts being used, of course. Valves are removable in the usual way through openings in the tops of the valve chambers, closed by screw plugs. The gears driving the camshafts are inclosed in an aluminum casing placed at the front end of the motor crankcase, and so are completely housed and thoroughly lubricated. A plain piece of pipe having two connections, one for each pair of cylinders, carries the exhaust to the muffler, while the inlet piping is



VIEW OF WESTINGHOUSE CHASSIS FROM ABOVE, SHOWING TRANSMISSION CASE, FOOT BRAKES, FLYWHEEL FAN AND STEEL PAN.

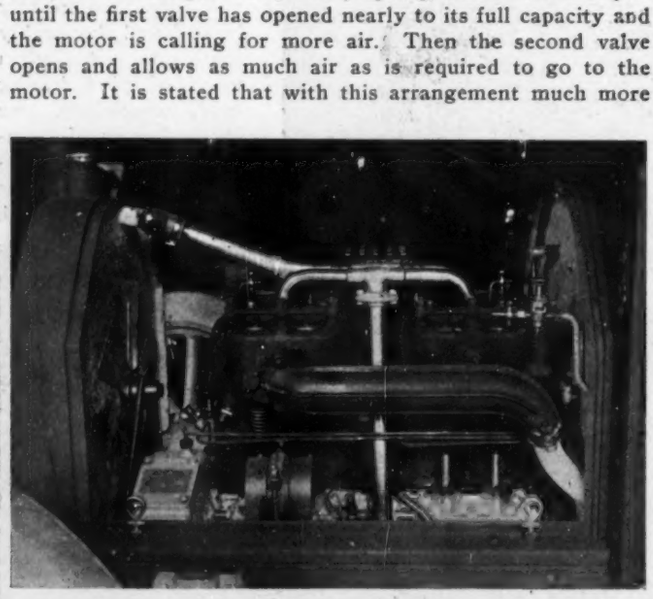
equally simple, a single T-pipe leading from the carbureter to the cylinders.

In the construction of the carbureter an interesting arrangement is introduced which, the manufacturers state, is responsible for the extreme liveliness of the car—the quickness with which it gathers speed after having been slowed down. The



INLET SIDE OF ENGINE, SHOWING IGNITION GEAR.

carbureter is of the float-feed type, and the air supply is controlled by two valves, normally held closed by springs, instead of the single auxiliary air valve frequently used. The spring on one of the air valves is very light, and will open readily when the motor is running its slowest. This valve is hardly large enough to pass all the air the engine requires when running fast, so a second valve is introduced and this is fitted with a comparatively heavy spring, which will not open until the first valve has opened nearly to its full capacity and the motor is calling for more air. Then the second valve opens and allows as much air as is required to go to the motor. It is stated that with this arrangement much more



EXHAUST SIDE OF ENGINE, SHOWING LOCATION OF MAGNETO.

satisfactory results can be obtained than by using a single spring, the difficulty of making one spring act satisfactorily through a wide range of pressures being obviated.

Ignition is by a mechanical make-and-break system, current for which is generated by a Simms-Bosch low-tension magneto, the only source of current supplied. No difficulty is experienced in starting the car on the magneto. The generator is placed on the left-hand side of the engine, low down, and is driven from the exhaust valve camshaft. The camshaft for operating the ignition tappet rods is on the inlet side, outside of the camshaft, and is not inclosed; its position is clearly shown in the engraving of the inlet valve side of the engine. The time of ignition is varied by varying the lead of the ignition cams—that is, when the ignition is to be advanced the cams are brought ahead so as to lift the tappets earlier in the stroke. When the ignition is to be retarded the cams are brought back. When the ignition is retarded to the fullest extent, a further movement of the ignition lever opens a little switch, cutting off the current and stopping the engine.

Current from the magneto is led to a set of switches mounted above the cylinders on the right-hand side of the engine, as shown in the engraving of that side, and from thence to the cylinders. The switches provide a convenient means of cutting out any cylinder or cylinders for testing purposes.

Circulation of the cooling water is effected by a gear-pump, gear driven from the exhaust camshaft; this pump replaces the centrifugal pump fitted on the 1906 Westinghouse car. The radiator, of large area, is of the honeycomb type and is backed by a belt-driven fan running in a bearing which passes through the radiator itself and is long and substantial. Besides this there is another fan formed by the blade-shaped spokes of the flywheel, which draws the hot air downward and backward from the motor.

There are thirty-six steel disks in the clutch, and the smoothness with which this picks up the drive is remarkable. As an interesting test of the delicacy of control to which the clutch is susceptible, the car was held stationary on a slight grade by the clutch alone. There was not the slightest perceptible movement of the car, and it required a glance at the operator's feet to make sure that the brake was not set. The engine was, of course, running.

Brakes are fitted to the rear wheels and to the countershaft. The countershaft brake is double, there being a drum and contracting band on each side of the gearcase. These brakes show clearly in the illustration giving a view of the chassis from above. It will be noticed that they are of large size, giving ample frictional area. The countershaft brakes are equalized by a system of levers. On the rear wheels the brakes are of the expanding type, inclosed in dustproof casings. These also are of large size and heavy construction. The hub brakes are applied by means of the usual hand lever. The lever oscillates a cross shaft which carries an arm at each end; from the arms steel cables extend to the brakes.

Gasoline is carried in a large tank in the rear of the car, and is sent to the carbureter by air pressure. No auxiliary tank is used, the gasoline going direct to the carbureter. The piping is of comparatively large diameter, thus making its obstruction very unlikely.

The easy running of the car is to some extent due to the free use of ball bearings. Hess-Bright annular ball bearings are used everywhere except in the engine; road wheels, transmission shafts and countershafts are ball bearing throughout.

Accessibility is a point to which a great deal of attention is given by the builders. Every part is so made and fitted that it can be removed with a minimum of trouble, and with the least possible disturbance of other parts. As a case in point, it may be mentioned that on one occasion one of the valve push-rods became stuck in its guide owing to an accidental blow which was severe enough to cause slight binding. To remedy this it was only necessary to remove the cap screws holding down the guide by its flanges and lift out the guide casting and with it the guide. The trouble was then easily reached and the necessary work done in the most convenient manner.

The smooth running of the engine is a very noticeable feature of the machine. When driving over ordinary roads there are absolutely no mechanical noises to be heard, and if it were not for the slight and unobjectionable whirring of the gears no sound whatever could be heard.

WHAT'S DOING AMONG THE AUTO CLUBS.

Chicago's New Automobile Club Elects Officers.

CHICAGO, Sept. 17.—With the expressed purpose of serving the same function in the automobile world in this city that the New York Motor Club does in New York, the Chicago Motor Club last week perfected its organization with the election of the following officers: President, William H. Arthur; first vice-president, Joseph F. Gunther; second vice-president, J. W. Hayden; secretary and treasurer, George G. Greenburg; directors, the above-named officials and Charles P. Root.

President Arthur was in cycling days president of the Illinois Cycling Club and chief consul of the Illinois division of the L. A. W.; Vice-President Gunther is treasurer of the Chicago Automobile Trade Association, and was the chairman of the committee that so successfully promoted the recent Algonquin hill-climbing contests, and the new secretary and treasurer, Mr. Greenburg, is an ex-member of the board of control of the National Cycling Association.

"In entering the Chicago field this infant organization seeks to fill a niche not adequately occupied by any body already in the field," explained one of the incorporators. "The success of recent reliability runs and hill climbs under the auspices of the combined automobile clubs indicates that there is a fertile field for the development of competition between owners of cars. In the palmy days of the bicycle there was no end to races of a thousand varieties, and all were well patronized and aided the sport. There is just as much opportunity for development of rivalry among the users of automobiles. While encouraging speed-making in contests, the Chicago Motor Club wishes also to stand for the observance of all existing laws governing speed. If the laws are unjust, it will attempt to secure their modification, but as long as the laws stand the club proposes to foster their enforcement."

The dues will be $10 initiation fee and $12 a year, but the directors decided that for the present $10 will cover the initiation and dues to the first of the year. Headquarters have not been chosen and will not be until there is a general meeting of the club.

It is the intention of the club to have a finger in the legal pie and to actively investigate tire-shooting cases and arrests where it is apparent that the rights of automobilists are being infringed President Arthur will be at the head of this department.

Buffalonians Go to Vanderbilt Race in Special Train.

BUFFALO, N. Y., Sept. 17.—Members of the Automobile Club of Buffalo will go to the Vanderbilt Cup Race in special Pullman buffet cars, which will be floated around the river at New York, put on the Long Island Railroad, and will be laid off within a few minutes walk of the course. It is really the only logical way for those coming from a distance. One car had been filled by Saturday of last week, and Dai H. Lewis, secretary of the club, who has charge of the arrangements, anticipates that it will be necessary to run a special train out of Buffalo. Motorists west or east of Buffalo desirous of joining the party should notify Secretary Lewis at once, in order that the proper reservations may be made.

Washingtonians Will Have Winter Club Functions.

WASHINGTON, D. C., Sept. 17.—At a recent meeting of the Automobile Club of Washington, President Duvall appointed a committee on entertainment, who will devise a series of club functions during the winter season. The club will be a year old in October, and it is proposed to celebrate the anniversary in fitting style. Captain Caverly is endeavoring to get up a party of club members to attend the Vanderbilt cup race October 6. A number have signified their intention of seeing the race, and the captain hopes to take over quite a party. He is also working up interest in a club run to the Frederick, Md., fair in October.

Tennesseans Strongly Interested in Good Roads.

NASHVILLE, TENN., Sept. 17.—At the last meeting of the board of directors of the Nashville Automobile Club, the board constituted itself a committee of the whole on good roads, with E. C. Andrews as chairman. This committee will exercise general supervision over this feature of the club's work, and it will be the duty of every member to report to the committee all breaks or points in the roads of the county in need of repair. The committee is further charged with the duty of taking all complaints about the roads up with the proper officials of the county with a view to having necessary repairs made. This committee will look into the public expenditures for the purpose of keeping the roads in good order, and ascertain if all such funds are properly and economically spent.

The question of exorbitant toll charges on the turnpikes was referred to Duncan R. Dorris, who was instructed to take up the subject with the turnpike officials and see if a better toll rate cannot be obtained. In the event that this cannot be arranged, he was instructed to look into the charters of the companies and ascertain what fees could lawfully be imposed, and if unlawful charges were made to recommend a remedy.

Riding 3,000 miles over the roads of his own state on one trip is the somewhat unique record of Samuel Prichitt, a Nashville Automobile Club member, who has just returned after an absence of two months spent in touring Tennessee. Mr. Prichitt had his family with him, and the trip was made in his Cadillac touring car. The experience was a rough one, says Mr. Prichitt, and shows that the roads of Tennessee need great improvement. The roads around Nashville are the best.

A bill has been introduced in the city council here by Councilman Baskette, prohibiting persons under eighteen years of age from driving an automobile or a motorcycle. It is believed that this will be amended to apply to persons under twenty-one years.

Kansas City A. C.'s Endurance Run a Success.

KANSAS CITY, Mo., Sept. 15.—A woman driver was among the nineteen cars to finish with a perfect score in the Kansas City Automobile Club's endurance run of 95.5 miles, September 11. She was Mrs. B. L. Swofford, and, while she did not drive all the distance, she was at the wheel long enough to demonstrate that she knows how to handle a car over all kinds of roads. The run demonstrated clearly the efficiency of automobiles on a long run over dirt roads, some of them soaked by heavy showers, for, in addition to the nineteen perfect scores, three cars finished, two of them with penalties of only two points, representing two minutes. Three cars failed to finish. Glidden rules were followed.

Aside from this gratifying result, an even greater object was accomplished. Much public interest was created, not only in Kansas City, but in the entire district through which the run was made. Nothing but the kindliest feeling was found from farmers and townspeople, and the motorists, recognizing the hospitality, did nothing to impair the good impression the run created. The run was to Paola, Kan., and return. The noon stop was at that city. Olathe, Kan., was the midway checking station. Two hours were allowed between checking stations, making the total running time eight hours, with an hour additional for dinner. But the conduct of the farmers was a revelation, and really the feature of an otherwise not very exciting run. They stood on their porches, crowded the front yards, and stood in the cross-roads to direct the tourists after dust and mud had wiped the confetti off the face of the earth. When the cars were running slowly they tossed apples into the tonneaus. The school children, dismissed from their duties to see the cars pass, showered the contestants with shelled corn. The attitude of the country people

was that of interest in the actual performance and possibilities of the cars, and whenever there was a tire repair to be made near a farmhouse or town they flocked about to see all they could of the workings of the automobile.

On every road a single toot of the horn was sufficient for the farmer to give not only half, but the entire road. There was no record of a single horse being scared on the trip or of any damage being done. Intent on taking no chances for the future, farmers brought their horses to the roadsides and held them within a few feet of the passing cars, asking the drivers to make all the noise possible. Hundreds of horses were trained in this fashion.

"Those things are going to bring good roads, and that's what the farmer wants," remarked one of them to THE AUTOMOBILE man. "There is no sense in being against automobiles, for there isn't one of us that isn't figuring on buying one some time. You see, I've got these horses of mine out here to train. They'll have to get used to them, for I hope to see many on these roads." He was only one of a hundred.

At Paola, a town of some 10,000, business was suspended, and teams of people who had come for miles from parts of the country not included in the tour, lined the streets. Houses were decorated with flags, bands were playing, the Mayor and other officials were there to shake hands and point out a leaky spot in the proverbially tight Kansas "lid," women formed reception committees for the women on the tour, and all that the heart of the motorist could wish for was furnished. Excellent accommodations were also provided for the noon stop.

From Kansas City the twenty-five starters (there were thirty entries) were sent away at intervals of three minutes, beginning at 8 o'clock. The first car in was due at 5 o'clock and the others three minutes apart. The starters and their officiai scores follow:

Driver	Car	Score	Troubles
C. E. Merrill	Olds	Clean score	
C. C. Meade	Ford	Clean score	
W. S. Hathaway	Buick	Clean score	
Fletcher Cowherd	Stevens Duryea	Clean score	
E. S. Cowie	Haynes	Clean score	
C. Boyd Richards	Olds	Clean score	
W. A. Williams	Jackson	Clean score	
B. E. Nace	White	Clean score	
W. B. Peltzer	Stevens Duryea	Clean score	
B. H. Rule	Stevens Duryea	Clean score	
C. E. Cook	Pierce	Clean score	
F. H. Thwing	Buick	Clean score	
J. J. Roddy	Winton	Clean score	
Irving Bunker (Mrs. Swofford)	Pope-Toledo	Clean score	
W. F. Guthrie	Rambler	Clean score	
George H. Davis	Locomobile	Clean score	Had tire trouble
C. F. Ettwein	Aerocar	Clean score	Had tire trouble
H. T. Fowler	Packard	Clean score	Had tire trouble
A. F. Seested	Pope-Toledo	Clean score	Had tire trouble
Frank Woodward	Pope-Toledo	Lost 2 points	Went into ditch
E. P. Moriarty	Stevens Duryea	Lost 2 points	Had tire trouble
W. H. Garland	Buick	Lost 216 points	Had tire trouble
W. R. Demester	Maxwell	Did not finish	Broke rear axle
C. L. Jones	Thomas	Did not finish	In ditch; tire trouble
J. D. McInnes	Franklin	Did not finish	Had tire trouble

At a meeting of the Automobile Club, September 13, it was decided, upon the vote of the contestants themselves, to let the club hold the cup, and to award to each of the nineteen who finished with a perfect score a silver medal, made so that it can be attached to the body of the car, if so desired. While no definite decision was reached regarding another run, it is likely that one will be held this fall after the race meet at Elm Ridge, October 3.

Rhode Island A. C. will Attend the Worcester Gymkhana.

PROVIDENCE, R. I., Sept. 17.—A club run to Worcester to participate in the Worcester Automobile Club's gymkhana and field day sports is on the tapis for the Rhode Island Automobile Club for Saturday, September 22. It is expected a large delegation will make the run the most successful of the season.

Although the fight against the police constables of the town of Warwick is not being publicly heralded, the auto owners of this city are working determinedly to compel the enterprising auto coppers to prove that their charges of excess of speed limit is something more than mere guess work on their part. Submissiveness to arrest and payment of fines without protest has been characteristic of automobilists in this vicinity in the past, but as it has reached a stage where it has become persecution instead of prosecution on the part of the police, indiscriminate arrests will be fought vigorously in the future. The town of Cranston seems to have hit upon a plan which could be followed to advantage by other communities. The chief of police here had a course marked off and took the numbers of all cars that exceeded the speed regulations. Notices were sent to the owners of the cars warning them, and it has had the desired effect.

CLUB DOINGS IN GENERAL.

SAN FRANCISCO, CAL.—Local automobilists are laying plans to organize a club for touring purposes under the name of the San Francisco Touring Club, and to work in conjunction with the Automobile Club of California. The object of the organization is to promote picnic runs, and, in the course of time, to have a clubhouse within reach of the city, where the members can enjoy luncheon and swap stories.

GRAND RAPIDS, MICH.—The Grand Rapids Automobile Club, through its efficient secretary, Dr. D. Emmet Welch, has secured a warrant for the arrest of J. M. Strong, the chauffeur who recently operated his machine in the city's streets in a wildly intoxicated condition. He was arrested at the time and fined lightly for the offense. The automobile club, feeling that strenuous steps should be taken to prevent future disgraceful exhibitions of this character, has proceeded against Strong for violation of the speed law.

LOUISVILLE, KY.—President George H. Wilson, of the Louisville Automobile Club, is enthusiastic over the recent run of the club to the Shelby county fair. "Not one mishap to the forty-five cars which made the trip, aside from minor tire troubles, was reported to me. Thirty-five autos paraded around the track seven or eight times, and each driver managed his car so successfully that the country people were assured of the dirigibility of the automobile, and I think we have helped to remove much of the odium that has been attached to it. Not a horse was frightened, which proves that they are beginning to know the automobile."

THE AUTOMOBILE CALENDAR.

Shows.

Sept. 22-29.....—First National Automobile Parts Show, First Regiment Armory, Chicago; A. M. Andrews, Secretary, 184 La Salle Street, Chicago.

Dec. 1-8.....—Seventh Annual Automobile Show of the Automobile Club of America, Grand Central Palace, New York City, under the patronage of the American Motor Car Manufacturers' Association.

Jan. 12-19.....—Annual Automobile Show of the Association of Licensed Automobile Manufacturers, Madison Square Garden, New York City.

Tours.

Sept. 22.....—Worcester, Mass., Gymkhana and Field Day of the Worcester Automobile Club, at Worcester Oval.

Oct. 1-2.....—St. Louis, Mo., Automobile Parade and Carnival, St. Louis Automobile Club.

Oct. 2-6.....—Endurance Run and Tour of the Binghamton (N. Y.) Automobile Club, to New York and the Vanderbilt Cup Race.

Oct. 6.....—Tacoma, Wash., Automobile Day of the Tacoma Automobile Club at Puyallup Valley Fair.

Oct. 20.....—Philadelphia, Pa., Cross Country Run of the Philadelphia Automobile Club.

Race Meets and Hill Climbs.

Sept. 22.....—American Elimination Trials for Vanderbilt Cup Race, on the Long Island Course.

Sept. 26.....—Joplin, Mo., 100-mile Road Race on 25-mile Circuit.

Oct. 6.....—Vanderbilt Cup Race, American Automobile Association.

Nov. 29.....—Riverside, Cal., Thanksgiving Day Hill Climb, Box Springs Grade Hill.

Jan. 22-26.....—Ormond-Daytona (Florida) International Race Meet, Florida East Coast Automobile Association.

A CHICAGO-NEW YORK TRY-OUT.

By E. R. E.

The 1,087 miles between Chicago and New York is sufficient enough test for any automobile, and a car which can negotiate this highway nicely is a safe medium of travel anywhere. For this much-traveled way has in its length a sample of every kind of road, and their succession is so inconsistent and the contrast so marked that there is hardly a mile that does not give some new interest in traveling. When we in a 24-32-horsepower American Mors of 1907 breed pulled away from the Chicago Beach Hotel a bright autumn noon and swung rapidly through Jackson Park, we hardly realized that we were to put the car to a test far more strenuous than any that could be devised at the factory.

Sales Manager John, of the St. Louis Car Company, said the trip was to be a demonstration one and that we would not hurry. We would call on automobile agents and take leisurely daylight rides between cities. But the tantalizing quality of that highway gets on to your nerves after a few miles, and the first thing you know you are hitting it off down some bumpy pike just to spite the road and show it that an automobile does not fear either its occasional speed temptations or its long miles of tonneau torment.

After leaving the smoky environs of South Chicago we fled over a worn-out macadam to Hammond and thence over a teasing speed course to Valparaiso. This was great, but it ended in sand and continued in sand. At South Bend they were still fixing the same street which was torn up when the A. A. A. world's fair tour went through there two years ago.

We started at noon the next day on a run of 184 miles to Toledo, over highway that seemed to reflect the countryside —good where the farmers seemed prosperous and poor where the tillers of the soil led a struggling existence. Good farming and good roads are complimentary. We remembered that road well because of the peculiarity that it followed, most of the way, a telephone line of thirty-nine wires—stick to the thirty-nine wire line and you were sure to be on the right road. Then, as dusk came and we lit the lamps that they might beat against a low-lying bank of gray, we struck a turnpike that had ruts of too-much travel in the same path, but with no cross ridges. It was a great ride, that—hurtling along into Toledo over an unknown but sure road and under the shy smile of a new moon.

East of Toledo the road promised well, and then it became later a chaos of sand and clay. We ran into a region of guide boards, but they served us little.

Passing Elyria, the run into Cleveland ends over a boulevard of which Paris might be proud. At first we ran it tentatively, afraid of policemen with notions on speed. Then we mustered the courage of the temptation and let that American Mors into her finest stride.

Of course, we left Cleveland by way of Euclid avenue, more famous than the town itself and leading onto a fine stretch that was in no place as good as some of the few short country boulevards which we had traversed, but which did not reach the other extreme. The average made for speed and the run to Erie was a quick one. Its last twenty miles, however, was an unbroken series of ridges that gave the swinging, jumping car an acrobatic aspect, and the tonneau passengers the best chance of their lives to judge the comfort of platform rear spring suspension.

Erie to Buffalo is a splendid country, made famous of old in bicycle days, even in the days when Stevens, on a high bicycle, started around the world. We made it in 3 hours 5 minutes, and at that lost a lot of time getting into the Bison City, because we took a wrong road.

The day that we left Buffalo we did not strike out Main street until just at dark, and the exhilaration of the rapid flight under a star-specked sky along a macadam road that puts a cup-racing course to shame, was of a kind to intoxicate and remember. Then it brought sudden reaction in one of the most uncertain, ruttiest, roughest roads in New York state. There were miles of good highway in New York and more miles of worse than bad ones. There is no average of excellence. High speed on the short stretches of macadam does not greatly affect a traveling average across the state. The proportion of good and bad is too unequal. Into Rochester, however, we had another of those night rushes with nothing to fear but traffic coming suddenly out of the darkness into the glare of the acetylenes.

A snake wriggles but it is sinuous. Rochester to Syracuse also wriggles, but it is angular. It is a road of clay, too, with stones and boulders to relieve the monotony of its ceaseless winding. We crossed the Erie canal so often over high, hump-backed bridges with a sharp turn at each side that we lost the direction, but knew we were on the right road.

We pulled out early from Syracuse and ran over an indifferent road through an indifferent but improving country, gaining in hills and seeming to lose in fertility, into Canastota for breakfast. Breakfast after an hour's brisk ride in the fresh morning of late summer is the best breakfast there is.

THE TEMPTATION TO SPEED RESULTED IN DUST RAISING.

The last few miles into Utica are fast ones, but eastward of that town we dropped into a region of railway and river and hills, beautiful and wonderful to behold, but the victim of road reconstruction. For miles we veritably plowed a way over torn-up state roads of old that are to be superb state roads of the new system. There was an excellent macadam scorch in the region of Schenectady and then that same almost conventional ending of the few good miles in the almost interminable bad ones. This time the bad ones were of parallel rows of stone flagstones of uncertain level.

Swinging into Albany of an early evening, we sighed with relief. The trip had not been tiresome, but the assurance of 150 miles as a last continuous jaunt over excellent roads is bound to be alluring. We had tested the car to a sufficiency and were proud of her. To-morrow's ride would be a lark.

In a way our anticipations were realized. The way down the Hudson is marvelous in more manners than one. It breathes of suburban wealth and urban influence. The first third of the road was not the Great White Way it had been cracked up to be, but the last portion is a winding, hilly boulevard that demanded speed of us to match its allurements, and we defied rural constables or whatever other opportunity there was to fall swiftly into the outstretched arms of the law and rushed for upper Broadway.

Then we recounted the trip and the way we had come over that thousand miles of a thousand different kinds of roads; and we marveled much in speculation of what will happen to railroading and traffic in general when the country has built long overland highways equal to the automobile.

THE AUTOMOBILE

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Alcohol When Used as a Motor Fuel. In an article by Thomas L. White on alcohol as a fuel in internal-combustion motors, which appears in this issue, it is pointed out that the advent of alcohol as a motor fuel is really an economic phenomenon. While, of course, a reasonable fuel efficiency must be presupposed, it is still largely true that "alcohol has come to stay, not because in this or that particular it is better or worse than gasoline, but because it can be produced anywhere, in any quantity, from the most diverse substances, at a cost which will steadily fall as the demand increases." There is practically no geographical limit to the growth of substances suitable for its production. A soil that will grow anything at all is capable of growing at least one of the products from which alcohol can be manufactured, and as to the cost, the fact that even to-day it is produced in Cuba at ten cents a gallon is eloquent of what we may expect when the demand increases. Within a few days Secretary of Agriculture Wilson has officially announced that he has experimentally produced alcohol from corncobs at a cost not to exceed three cents a gallon. It was prophesied years ago by an eminent French economist: *"La substitution de l'alcool a petrole, c'est tout un programme économique."* It is the sheer inevitableness of economic movements which occasions the use of alcohol as a motor fuel rather than the incidental result of a bill to remove the tax that goes into effect next January.

When to the economic advantages of alcohol are added certain technical or practical advantages incident to its use its strategic position in the coming battle of fuels may be viewed as forecasting a sweeping victory. For instance, so far as unintentional explosions are concerned, alcohol is practically foolproof, and the possibility of extinguishing an incipient blaze with a bucket of water is one that the garage owner is not likely to overlook. In the commercial vehicle field especially the "safety" of alcohol as a fuel is certain to bring it into extensive use.

All indications point to the necessity for careful investigation of the engineering problems involved in the use of alcohol on the part of automobile builders, so as to be in a position of preparedness when it becomes a commercial necessity.

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The Pronounced Increase in Fall Touring. If anything were needed to accentuate the marvelous growing popularity of the automobile for pleasure touring, the enormous increase in the number of fall tourists would tell this story in convincing form.

Autumn is the most delightful time of the year for automobiling, and it is owing to this fact that the selling of cars continues and lengthens the buying season, until there remains only a short interval before the innings of the shows begin. This year the first exhibition will take place in December, but many purchasers, already knowing what they want and where they can get it, are selecting the new models without even waiting for the annual national displays in New York and Chicago.

The joys of fall touring are swelling the automobile army to an unprecedented extent, and every new automobilist adds to the numerical strength of the thousands that are working for the needed admitted improvement of our main arteries of travel. Once one has tasted these charms of touring over good roads, he subordinates all other agreeable sensations to a secondary position, and wonders why he had not discovered earlier the acme of individual transportation. Health and happiness are synonymous with automobile touring, and the physician when at loss to prescribe something else now suggests the automobile, as he once did the bicycle, and invariably it meets the requirements of the situation.

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Recent Army Experiments with the Automobile The past season has been productive of some interesting results in the experiments made by the war departments of our own and foreign countries to determine the practicability of the automobile in army maneuvers. These experiments have not been made with a view of demonstrating the auto's use in aggressive warfare, but to show its value when considered as an auxiliary force. In the German army maneuvers the early part of the present month the volunteer corps was provided with thirty-seven cars in charge of uniformed drivers to transport staff officers to various parts of the field, and the celerity, convenience and reliability of the machines under trying conditions were highly praised by the military tacticians who watched developments. What may be said of the results in Germany is equally true of the recent French and Austrian maneuvers, where admirable service was rendered under similar circumstances.

In the United States the attention of manufacturers has been engaged in noting the results of experiments of the War Department with automobiles, notably at Mt. Gretna, Pa., under Gen. Fred Grant, and at Camp Tacoma, Wash., under Gen. Fred Funston. Preliminary reports from both these experimental stations show excellent service rendered by the cars in operation, both for the transportation of field officers to their locations and the transmission of orders, and in the signal service corps, where specially fitted cars, designed from plans formulated by Gen. A. W. Greely, have proved a revelation of efficiency.

With the advent of successful use of alcohol as motive power, the future market for autos in the military field promises to be large. Alcohol's comparative freedom from explosion renders it a more desirable article as a fuel in army work, and, with its efficiency proven and adoption made certain by successful experiment, the time will be materially advanced when no army corps, division, regiment or company will be considered equipped for field service without its quota of automobiles.

A. C. A. SIXTH SHOW STATEMENT.

With a financial statement showing a reservation of $9,000, withheld for pending disputed claims, the Exhibition Committee of the Automobile Club of America, through Secretary S. M. Butler, announces a balance at present available for division among exhibitors of $2,058.53, or 3.673 per cent. to each exhibitor on the amount of space rental paid.

While the disputed claims, the committee states it is advised by counsel, have no merit in fact, yet it has been thought wise to reserve this sum, which should be more tha nsufficient in case of adverse decisions. The committee anticipates a favorable outcome, and hopes in a short time to be able to make a larger and final distribution. The total receipts are given as 98,462.22, with an expenditure of $80,345.15 and the reservation of the $9,000 held for disputed claims.

The Sixty-ninth Regiment, in whose armory the January 13-20 show was held, received $5,000; one-half of the remaining profits went to the A. C. A. and one-half to the exhibitors, each receiving $2,058.53. The receipts from space rentals totaled $56,043.28.

In explanation of its figures, the Exhibition Committee calls attention to the embarrassing conditions under which it labored. States the committee:

"The condition upon which the show was predicated was the obtaining from the military authorities of the state of New York and the Sixty-ninth Regiment, early in April, 1905, their permission for the use of the Sixty-ninth Regiment Armory, on the then apparently safe expectation that said armory would be completed by the contractors and have been turned over to the regiment some weeks prior to January 13, 1906, the date of the proposed show. As is well known, this expectation was not realized, the building was not completed and turned over (nor as a matter of fact is it yet entirely completed at this date), and the committee's only alternative was to accept the inevitable and arrange with the contractor, with the consent of the city authorities, and bear the burden of performing all of the temporary construction work of carpentering, electric wiring, plumbing, steam fitting and temporary heating during such construction work, necessary to render the building fit for occupancy by the show.

"The committee share with the exhibitors the regret that the rebate was not larger, but feel that when the latter consider that the committee had to deal with an unfinished building and to organize and carry, to a successful conclusion under the most adverse circumstances, the machinery of so large a show, that they will view the result with satisfaction."

THE CHICAGO PARTS SHOW.

CHICAGO, Sept. 17.—The Automobile Parts and Accessories Show, which is to be given at the First Regiment Armory beginning next Saturday, is attracting much interest. General Manager A. M. Andrews announces several special club nights. The Chicago Automobile Club is to have Wednesday night, and half of the receipts from admissions will be given to the club to go into the building fund. Thursday night will be set aside for the Austin Automobile Club, one of the most flourishing auto bodies in the country. The dealers will have Friday night, and Saturday night has been reserved for the chauffeurs. Each purchaser of a ticket will receive a coupon with which he is entitled to vote for, in his personal opinion, the best chauffeur in the city. A gold watch goes to the best vote-getter. As the eliminating race for the Vanderbilt cup takes place Saturday, the opening day of the show, arrangements have been made for securing bulletins.

Manager Andrews states he is highly pleased with the interest that manufacturers in all parts of the country are taking in the coming show. Requests for space have been generous, and it is anticipated that at least 100 different exhibitors will make displays. The decoration of the big building will start the early part of the week and it will be of black oak. The signs will be green with gold letters. No absolutely complete cars will be shown, as was announced when the show was first contemplated.

CHICAGO SHOW ANNOUNCEMENT.

Application blanks for space at the Chicago show and diagrams for all of the sections will be mailed to the trade this week. All applications will close October 1, and the allotment will be made October 3 and 4. The date of the show will be February 2-9.

The entire gallery of the Coliseum and as much of the second floor of the Coliseum Annex as may be needed will be alloted to the members of the Motor and Accessory Manufacturers.

Members of the National Association of Automobile Manufacturers, Inc., will be allotted space October 3. The members will be entitled to attend the meeting and draw for the order of selection, and on completion of the drawing will select space in their proper order. The amount of space to which each will be entitled will be determined by the management in advance. The remaining space will be allotted to other exhibitors October 4, the same method of allotment being followed.

The space set aside for the Motor and Accessory Manufacturers will be allotted by a committee of that organization October 3. Applications by members of the Motor and Accessory Manufacturers should be mailed to D. J. Post, president, Hartford, Conn., and all other applications to S. A. Miles, manager, 7 East Forty-second street, New York. The rules provide that no application may be considered in the first allotment unless received by noon, October 1.

The exhibition will be open only to those who have not, since September 1, 1904, taken part in a show which has not been sanctioned by the National Association of Automobile Manufacturers, Inc. The show will take place at the Coliseum and First Regiment Armory, as was the case last year.

QUAKER CITY'S NEXT AUTO SHOW.

PHILADELPHIA, Sept. 17.—Through the sapient efforts of Chester I. Campbell, the well-known show promoter, the conflicting interests in the local automobile trade were brought together at the Hotel Walton last Thursday, the result being the organization of the Philadelphia Auomobile Show Association. The only discordant note to mar last winter's show in the National Export Exposition Building, which was managed by Mr. Campbell, was the failure of some disgruntled agents and branch managers to "come in." It wasn't Campbell's fault, but was a legacy from former shows and resulted from alleged "throw-downs" administered to the "outs" by the "ins"—one complaint, for instance, being an unfair distribution of space.

In view of the probability of an advance of the show date in conformity with the change in date of the national exhibitions, Mr. Campbell saw the necessity for an early move and the result is a testimonial to Bostonese sagacity, for all the formerly conflicting interests are now pulling together. It was a veritable love-feast. Percy L. Neel, president of the Quaker City Automobile Company, who had refused to subscribe to space in last February's show, was elected president of the Show Association—a big concession—and the various Popes and the Franklin, which his company represents, will, of course, be in the line-up next January, or whenever the show is held.

President Neel's first action was the naming of a show committee—W. J. Foss, Pierce-Arrow; W. F. Smith, Rambler, and W. Wayne Davis, Packard. After a general discussion as to the best place to hold the show, the meeting adjourned to meet on Monday, September 24. It is understood that the Export Exposition Building is now in use as an annex to the City Almshouse, and must be eliminated from the list of possibilities. There is no structure within twenty minutes of the city's center which approaches in dimensions the Exposition Building, and the present outlook would seem to indicate that the Committee on Site has its work cut out for it.

MISSOURI'S GOOD ROADS CONVENTION.

At the meeting of the Missouri State Good Roads Convention, held at Chillicothe, Mo., from September 3 to 8, the creation of the office of state highway commissioner was favored, and it was decided to hold the next meeting during the winter of 1906-7, during the session of the State Legislature. The meeting will be held at Jefferson City, the state capital.

No permanent organization was formed at Chillicothe, though many prominent good roads men were present at the meeting from more than 50 of the 114 counties of the state. Various plans for promoting the construction of good roads were discussed, including changes in the mode of taxation and changes in the state constitution. Politics were conspicuously absent from the meeting.

Practical talks in the art of road building and road repairs and maintenance methods were given by experts on these subjects, and there was a large display of road machinery. A. N. Johnson, highway engineer of Illinois, outlined the road system in operation in his state, stating that though only in operation for a year the system had proved highly satisfactory. Much of his address was devoted to the subject of dirt roads, and he declared that many roads that are not now fit to travel on could be made good by dragging. D. Ward King, of Maitland, Mo., inventor of the split log drag, which bears his name, was present.

The interest taken by farmers in the good roads question was exemplified by the case of John Harrison, who has a farm near Fayette. Mr. Harrison has made a standing offer to contribute $1,500 toward the construction of a road passing his farm, stating that he is isolated for four months in the year owing to the impassable state of the roads.

The convention finally declared itself in favor of a change in the constitution as a means of road improvement, though it will take two years to bring this about.

VERMONT HAS THE GOOD ROADS FEVER.

BURLINGTON, VT., Sept. 18.—An enthusiastic good roads conference was held here at the City Hall, and the result is a convention will take place September 20 and 21 to promote this work in Chittenden County. An executive committee of nine was appointed, and this committee met and appointed several sub-committees which will have the work in charge. The plans of the National Good Roads Association were outlined by Wellington E. Loucks, of St. Louis, national organizer of the association, and his report of work accomplished in other states was received with much interest. Mr. Loucks said, in the course of his remarks, that Nature had been extremely good to Vermont in the matter of road-making material, and that on every hand he had seen plenty of it, so that the state need have little expense in highway construction.

Meetings have already been held in Bennington, Brattleboro, Windsor, and White River Junction, and others will follow at St. Johnsbury, St. Albans, and Rutland.

AUTOMOBILE EDUCATION BY MAIL.

For some years the value of correspondence methods as a means of disseminating education has been recognized, and has been adopted in various branches of study with signal success. It is therefore not at all surprising that a Correspondence School of Automobile Engineering has been organized and is in successful operation, with headquarters in New York City, in the Flatiron Building. Victor R. Lougheed, vice-president and general manager of the school, states that the idea has taken hold of would-be chauffeurs to such an extent that there are a thousand students on the list and more are coming in daily. About thirteen thousand inquiries have been received regarding the courses. An exceedingly complete set of illustrated text-books is used in connection with the courses, making each point entirely clear. Well-known experts have compiled the papers, which are therefore practical to the last degree.

BALTIMORE'S PARADE AN AUTO TRIUMPH.

BALTIMORE, Sept. 17.—Another triumph has been added to the automobile's record of achievement. In the carnival parade, which last Friday night marked the climax of Baltimore's celebration of its recovery from the great fire of 1904, the automobile division carried away the chief glory. Certainly nothing like it ever had been seen in Baltimore.

There were 60-odd cars in line, 47 of which were in the special division, the rest being strung along the length of the route. In the first auto—an electric runabout—rode Chief of Staff Bushrod Watts, who tips the scale on the far side of the 300-pound mark. Following his vehicle came the Jubilee directors and aids, and then the members of the Automobile Club of Maryland. Every automobile in the line carried some sort of decoration and every one was beautiful. Electric lights, ferns, flowers, flags, bunting, Japanese lanterns, Greek fire—all had a share in the scheme of festal attire. One touring car carried a party dressed in costumes of the Elizabethan period. Another machine was fairly hidden under Marechal Neil roses, white and pink carnations, asters, ferns, palms, bunting, flags and evergreens. Passing the brilliantly lighted plaza in front of the City Hall the scene was splendid, yet the enthusiasm which greeted the automobilists there was not greater than it was all along the line. They came first in the parade and they assumed without difficulty the first place in the estimation and applause of the vast crowds.

WALTHAM PREPARING FOR A BUSY SEASON.

The makers of the Waltham Orient motor cars and Orient buckboards, with factory at Waltham, Mass., have planned to double their output for 1907. They have purchased six lots adjoining their present plant and are securing bids for several new buildings, which when completed are to be equipped with the most modern machinery and tools. Their estimated production for 1907 will consist of 200 touring cars and 2,000 buckboards. The line comprises two 20-horsepower governor controlled cars, one listing at $2,000, the other at $1,750, also a 16-horsepower runabout for $1,250. There is a 4-horsepower buckboard friction transmission at $400, and a delivery car of the same type and power for $450.

Since the resignation, September 1, of General Manager L. B. Gaylor, owing to poor health, the affairs of the company are being administered by an advisory committee, consisting of Manager E. S. Church, Sales Manager E. P. Chalfant and Auditor L. J. Hart.

A Y. M. C. A. SCHOOL FOR COLUMBUS, O.

COLUMBUS, O., Sept. 17.—An automobile school will be started October 1 by the Y. M. C. A. of this city. C. C. Bramwell, superintendent of the motor department of the Columbus Buggy Company, who made the first automobile run on the streets of Boston, will instruct one course, designated "Course A." He will deliver lectures which will include the history of the development of the gasoline motor, carbureters, spark coils, plugs, batteries, etc.

W. G. Grube, who has charge of the repair department of the Curtin Williams Company, will conduct Course B. Students will review the first course and will be given an opportunity to put into effect the knowledge thus obtained. The third course in the spring will only be open to those who have taken the first two courses.

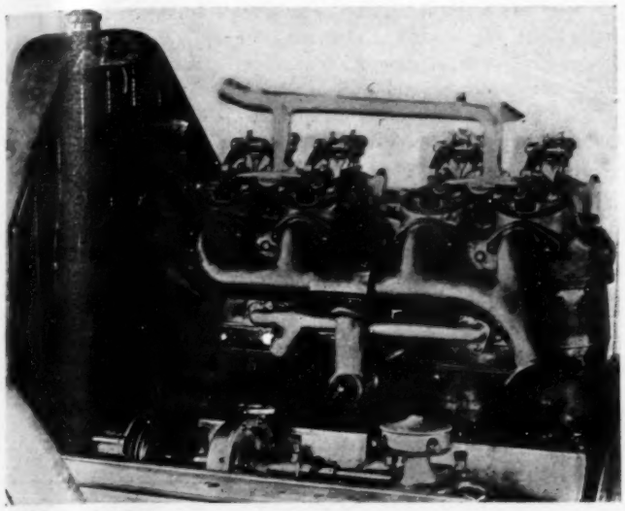
AUTO FLORAL PARADE AT OMAHA.

One of the most entertaining features of the annual Ak-Sar-Ben festival at Omaha, Neb., this fall, will be an automobile flower parade, which will be held October 4. The event is open to all automobile owners in Nebraska and western Iowa, and 800 invitations have been sent out to automobilists in the territory mentioned. This will be the second auto parade under the auspices of the Ak-Sar-Ben, one having been held three years ago.

CONSTRUCTIONAL DETAILS OF POPE MACHINES

WHILE the descriptions of the new Pope cars for 1907, published in the last issue of THE AUTOMOBILE, give a good general idea of the machines, there are many constructional details that could not well be included, and these will doubtless be of interest to mechanically inclined readers.

In the engine of the big Pope-Toledo 50-horsepower car, the valves open directly through the cylinder heads and are of such large diameter that if placed with their stems vertical there would not be room for them in the cylinder heads. But the valves are set at an angle. Each valve is contained by a cage on the bottom of which is formed the valve seat, flat in both inlet and exhaust valves. In the angle between the cages, on the top of the cylinder, is a pillar, which supports the rocker arm which actuates both valves, one end working the inlet valve and the other the exhaust valve. On the inlet valve side the long vertical push-rod is connected to the rocker arm, and is adjustable for length by means of a threaded sleeve and jam-nut. This push-rod is not made continuous down to the cam, but is in two sections, as in the ordinary form of construction, the upper section, connected to the rocker arm, extending down into the guide, and the lower section, carrying on its lower extremity the cam roller, extending upward in the guide until it meets the upper section. The latter is pressed down by a spring.



LEFT SIDE OF POPE-TOLEDO 50-HORSEPOWER MOTOR.

Three D. W. F. ball bearings support the chrome-nickel steel crankshaft; the pins and journals are drilled out for lightness. Plain bearings are used in the connecting rods. Sheet copper water jackets are retained, the upper and lower edges of the jackets being inserted in grooves cut in flanges integral with the cylinders, and the grooves filled with packing rings which make tight joints. As the cylinders are cast in pairs, a single jacket surrounds each pair.

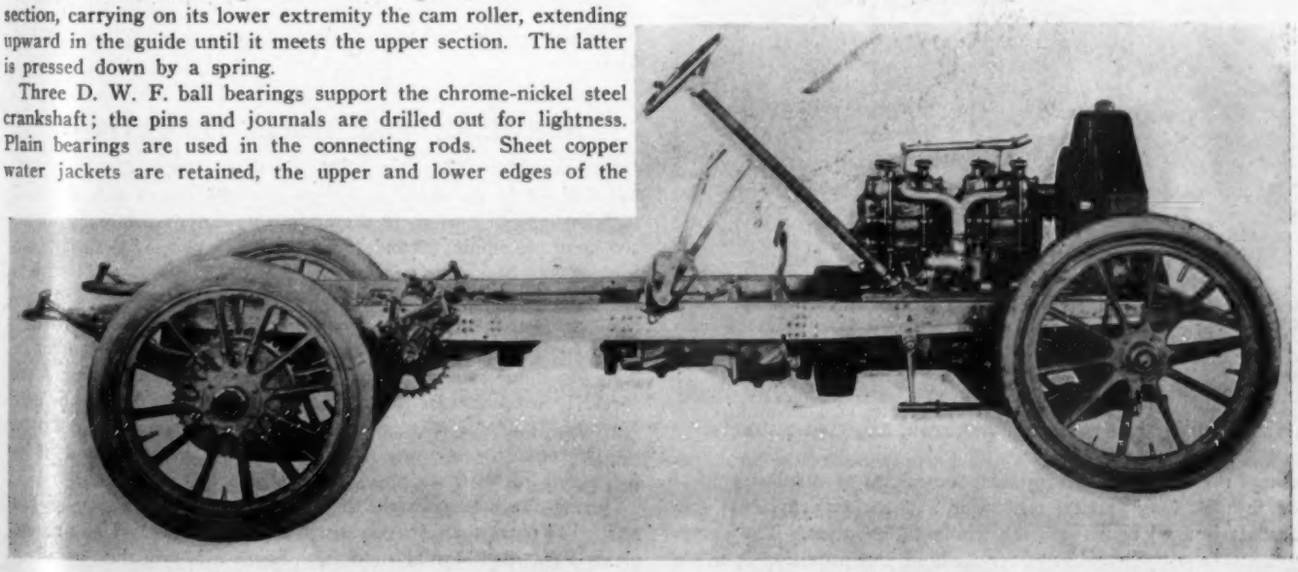
Valve cages are held down by three studs each. An interesting arrangement is adopted for equalizing the spring tensions on the exhaust valves. Between the two exhaust valves of each pair of cylinders is pivoted a double-armed lever with forked ends. Each fork straddles one of the exhaust valve stems above the spring, and engages a guide in which the valve stem moves. This, of course, insures the equalization of the spring pressures of the exhaust valves. The inlet valve springs are not equalized.

All the valves are actuated by a single camshaft on the right-hand side of the motor. On the opposite side is a gear-driven shaft, running at half the speed of the crankshaft, driving the rotary pump, the high-tension magneto, and the timer, the latter being carried by a very short vertical shaft driven by bevel gears and running in ball bearings. The fan is carried by a bracket bolted to the front of the motor, runs in ball bearings, and is belt driven. The timer is of the roller contact type, and is thoroughly encased and protected.

In a forward extension of the change-speed gearcase is contained the multiple disk clutch, the shaft between the flywheel and the gearcase being just long enough to carry a universal joint. There are four forward speeds and a reverse. The countershaft is placed some distance back of the gearcase, and power is transmitted through a shaft with two universal joints. The countershaft of course carries the spur gear differential. All the gearshafts and the countershaft are mounted on D. W. F. ball bearings throughout. Direct drive is on the third speed, and the fourth speed is intended only for exceptionally fast running under favorable circumstances.

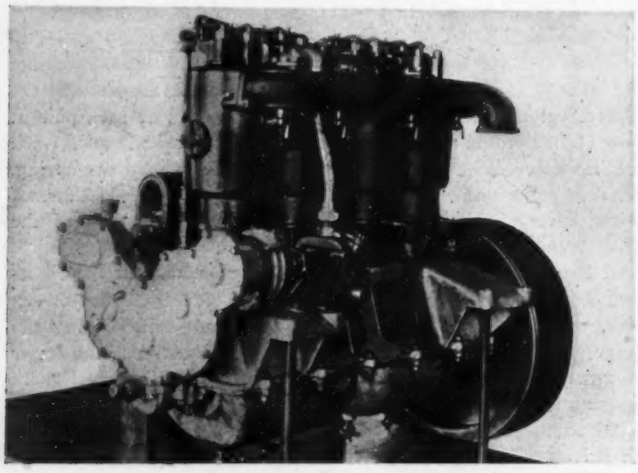
Channel steel is used for the framing, but is arranged in an unusual way, the open side of the channel being down instead of to the inside. The lower edges of the channels are beaded over, adding stiffness; spacing tubes are placed on all bolts that pass through the frames, so there is no tendency to crush the channels. Seven cross members are used. The contour of the side members is similar to that of the usual form of steel frames, tapering toward the ends.

Both axles are made from I-beam steel forgings and both are dropped. The axles are electrically welded in the center. Steer-



CHASSIS OF THE NEW POPE-TOLEDO SEVEN PASSENGER CAR, SHOWING THE ARRANGEMENT OF THE MECHANISM.

ing knuckles are of the reversed Lemoine type, the pivot being below instead of above, thus bringing the weight of the front end of the car low down. Steering gear is of the gear-and-segment type, the wearing parts being of hardened steel and inclosed in a tight housing. Ignition and throttle levers are carried on the top of the steering wheel, in the usual way. All the wheels run



POPE-HARTFORD 30-HORSEPOWER MOTOR, LEFT SIDE.

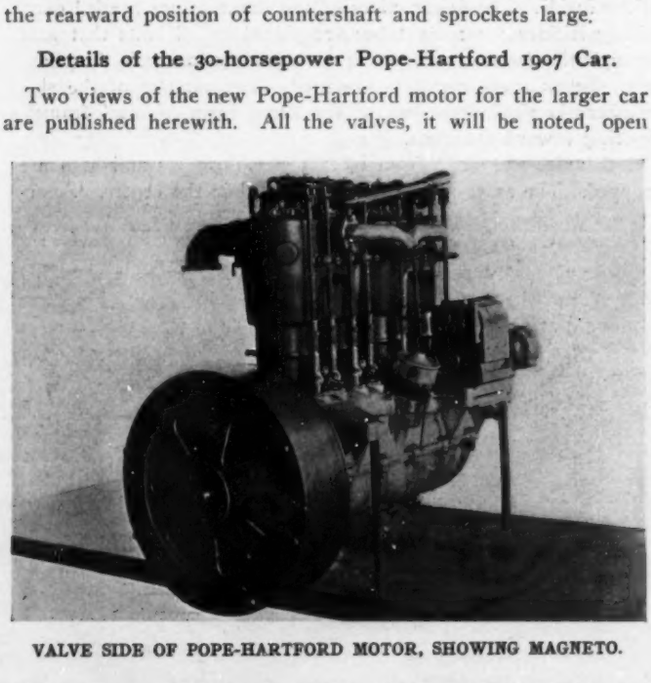
on D. W. F. ball bearings, and the steering knuckles are fitted with ball thrust bearings. Spring seats are forged integral with the axles, and the springs, of the semi-elliptic type and very long, are attached by means of clamps passing over them instead of being weakened by being drilled for bolts.

Hub brakes are of the contracting band type, the drums being formed integral with the rear sprockets and bolted to the spokes of the wheels. The hub brakes are operated by a hand lever. The foot brake is also of the contracting band type and is placed on the propeller shaft just forward of the countershaft housing. Both brakes are of heavy construction, as are also the connections.

The chains for the final drive are made as short as possible by the rearward position of countershaft and sprockets large.

Details of the 30-horsepower Pope-Hartford 1907 Car.

Two views of the new Pope-Hartford motor for the larger car are published herewith. All the valves, it will be noted, open



VALVE SIDE OF POPE-HARTFORD MOTOR, SHOWING MAGNETO.

through the heads of the cylinders, and all are mechanically operated through long vertical push-rods and rocker arms; but one camshaft is used to actuate the whole eight valves. The car is regularly fitted with batteries for ignition, but provision is made for the installation of a magneto, and one is shown on the motor illustrated, driven by gears on the right-hand side. The timer is also on this side, low down and out of the way of accidental damage. All the gears are inclosed in an aluminum housing placed at the front of the engine; the entire front of this housing can be removed for the inspection of the gears. Cylinders are cast in pairs, with their water jackets integral. The spark plugs are set into the sides of the cylinders, as the engraving of the camshaft side shows, just between the vertical valve rods. On the opposite sides are the compression relief cocks. Lower down, below the water jackets, are the connections for the oil pipes. A fitting for the fan is bolted to the forward side of the forward cylinder.

The framing of the Pope-Hartford car is interesting, consisting of side pieces of seasoned ash flitched with heavy steel plates bolted on after the hot riveting has been finished. Sub-frames, carrying the engine, are of channel steel and are riveted to cross members. The arms supporting the engine are cast on the upper half of the crankcase and rest on the tops of the subframes, bolts passing down through arms and frames. The lower half of the crankcase can be removed, in the usual way, without disturbing the working parts of the motor.

The clutch is an aluminum reversed cone with wide leather facing, and is inclosed in the flywheel.

Much interest is being evinced in the new Pope designs, and their performance will be closely watched to see how the new ideas work out in the hands of purchasers.

FIRST OF THE E. R. THOMAS LIGHT CARS.

BUFFALO, Sept. 17.—The first of the light touring cars to be manufactured by the E. R. Thomas Detroit Company arrived in Buffalo, Thursday, after a satisfactory trip over the road from Detroit. The odometer showed 299 miles in all, the route was cross country and the time consumed was a day and a half. The car had never been run fifty miles before the start from Detroit, but no breakages of any kind occurred. There was not a hill on the entire run that the car could not negotiate on the high-speed gear.

It was driven over the road by D. B. Huss, the well-known operator, and in the car were R. D. Chapin and H. E. Coffin, of Detroit, and H. L. Keats, of Portland, Ore.

Several noticeable features were brought on by the trip. The oiling system proved economical, almost no water was evaporated and an average of sixteen miles per gallon of gasoline was maintained.

The car was welcomed at the Thomas factory in Buffalo by E. R. Thomas, who is president of both the Buffalo and Detroit companies. Many Thomas agents had come in for the arrival of the car, and all seemed very well satisfied with the showing made on the trip and with their own inspection of the machine itself.

NORTHERN WILL TRIPLE ITS OUTPUT.

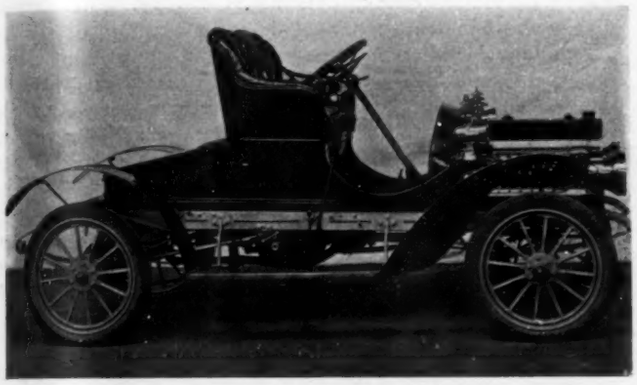
DETROIT, MICH., Sept. 17.—The Northern Motor Car Company has decided to go ahead and erect a model automobile plant of sufficient capacity to more than triple its output. Already about 400 men are employed and for the greater part of the year the factory has been working overtime in their effort to fill orders for the two-cylinder touring car. The new plant will be of the latest modern fireproof construction and will include every facility that experience can suggest for the rapid turning out of automobiles. In connection with the plant, which will embrace some forty acres, is proposed to include testing grounds where the new Northern four-cylinder 60-horsepower car, which is said to be the lightest car per horsepower in the world, can be tested at its full speed.

During the past year the Northern Motor Car Company has purchased more than $75,000 worth of machinery, and its present plant is crowded beyond endurance, hence it is said the new plant has been in the minds of the Northern people for some time as something that would become ultimately necessary.

1907 RAMBLER RUNABOUT.

Only one runabout will be included in the list of models manufactured for 1907 by Thomas B. Jeffery & Co., of Kenosha, Wis., manufacturers of the Rambler cars. And this will be a developed runabout, of good size and substantial construction, designed for real hard work. The double-opposed cylinder motor, having cylinders of 4 1-2 inches bore and 5 inches stroke, is so located and constructed that every part is readily reached, thus overcoming an objection frequently made to horizontal motors under the body. Ample power, easy springs and a comparatively long wheelbase—90 inches—make the runabout suitable for all-around work and comfortable to ride in. The car is called Model 27.

The motor crankcase is carried out so as to form a housing in which the flywheel, the clutch and the planetary change-speed gears are enclosed, and the unit thus formed is hung from three points and is not affected by springing or twisting of the frame; the bearings cannot get out of line. The clutch is of the multiple-disk type, with thirteen disks. Two forward speeds are given by the planetary gears. Pressed steel framing is used. Springs are long and broad, and have rather light leaves, this construction tending to flexibility. Front springs are semi-elliptical, and rear springs full elliptics with involute ends, and all are 38 inches



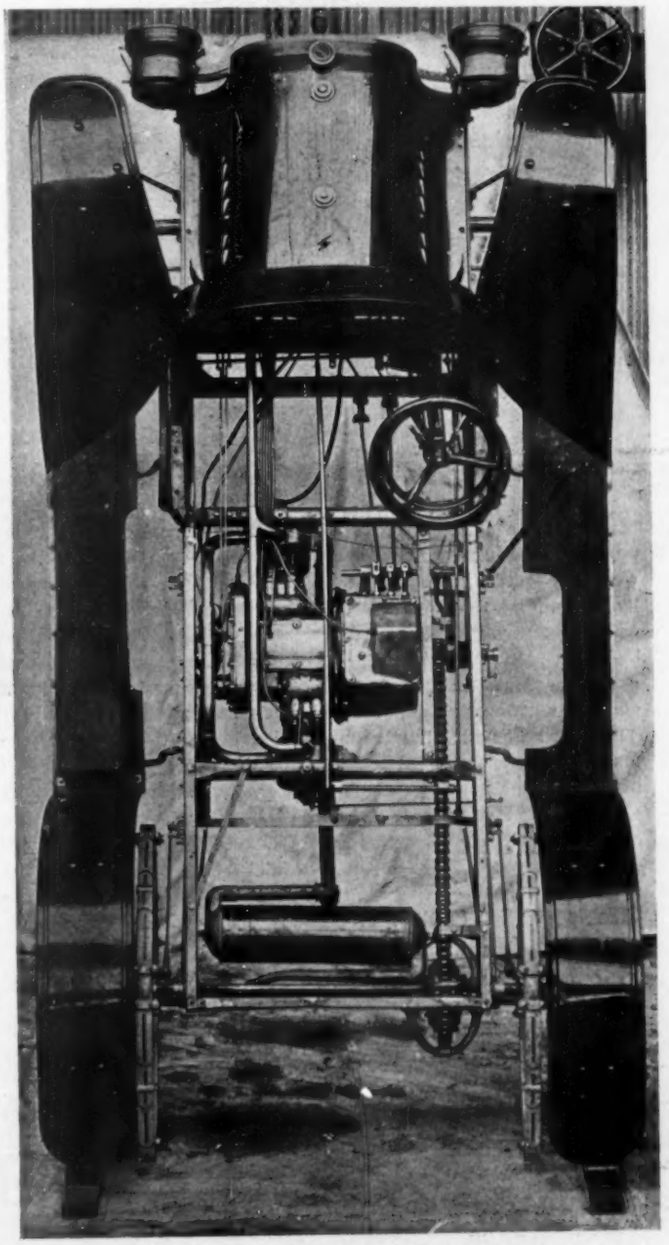
RAMBLER OPPOSED CYLINDER RUNABOUT FOR 1907.

long. The wood artillery wheels are 30 inches in diameter and are fitted with 3 1-2-inch tires.

Cylinders are cast, with integral heads and jackets, of close-grained gray iron, and are ground to a finish; pistons are of the same material and are fitted with four rings each. The nickel steel valves are of large diameter and of special design to prevent warping, and are mechanically operated by two camshafts, this arrangement permitting the use of short valve stems. Connecting rod big ends are hinged and adjustable through a hand hole in the top of the crankcase. The piston pins are rigidly clamped to the tops of the connecting rods and work in bearings forked in the piston bosses. This gives a large wearing surface and prevents the working out of the pins. The bushings are of bronze. The spark plugs are placed directly over the inlet valves. Water circulation is by thermo-syphonic action and the radiator is of the flat-tube type. Lubrication is by pressure feed from an oiler on the dashboard.

The two forward speeds are controlled by a hand lever by the side of the operator, while a pedal on the footboard operates the reverse. A hand lever controls the emergency hub brakes, while a pedal connects with the transmission brake. The hub brakes are enclosed in housings formed integral with the wheel hubs, and are operated through an equalizing lever.

A feature of the new car is that the body is fastened by means of lock hinges, and has no other connection with the chains. There are two of these hinges on each side. By loosening the knurled hand-nuts on each hinge the body may be entirely removed. If the two nuts on one side are loosened, the body may be tilted to the opposite side for the inspection of machinery; either side may be lifted. In this way the motor and transmission can be got at very easily. By releasing one of the motor supports and removing the bolts holding the gearcase cover to the motor, the entire transmission gear may be removed. By disconnecting the rods, the crankshaft can be taken out without disturbing other parts, and, by taking off the cover plate of the crankcase, the camshafts can be taken out without interfering with the valves. These features will surely appeal to automobilists who know what it means to crawl under a car and take down a lot of piping and other parts to get at some insignificant



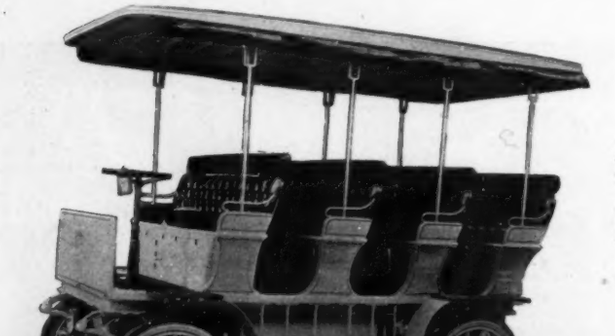
CHASSIS OF RAMBLER RUNABOUT SHOWING MECHANISM.

thing that is causing trouble. All the parts of the new Rambler power plan are reached from above. Final drive is by single chain to a sprocket placed near the right rear wheel, and the chain used is heavy and substantial. The muffler is large, with cylindrical shell, and is at the extreme rear end of the frame. Exhaust piping is short and of large diameter. Mudguards are wide enough to give the passengers ample protection from flying mud.

Two sets of dry cells, two oil side lamps, wrenches, oilers, tire pump and tire repair kit are included in the price—$950—of the Rambler runabout.

AN ELECTRIC HOTEL CARRYALL.

The peculiar adaptability of the large passenger-carrying automobile for hotel service has resulted in a number of such machines being operated in connection with hotels in various parts of the country. An electric machine purchased by a hotel firm in Cleveland, O., is shown in the accompanying engraving. The



ELECTRIC HOTEL CARRYALL USED AT PUT-IN-BAY, OHIO.

car seats seventeen persons on four comfortably upholstered cross seats, and has a maximum speed of eleven miles an hour with full load. Protection from rain, wind and sun is afforded by a standing top and side curtains, these being rolled up, of course, in fine weather. The car is a Columbia, manufactured by the Electric Vehicle Co., of Hartford, Conn., and consists of a regular Mark LII chassis, of the type usually fitted with a delivery wagon body but with passenger body attached instead.

In common with other commercial vehicles of this make, the machine has a frame of I-beam iron, and is propelled by two motors connected to the driving wheels by spur gears and short side chains. The battery consists of forty-two 13 M. V. Exide cells and is slung under the body. The wheels are 36 inches in diameter and are fitted with 3 1-2 inch solid rubber tires; the wheelbase is 92 inches. The purchase was made through the Ohio Motor Car Co., of Cleveland.

PITTSBURG NEWS OF THE TRADE.

PITTSBURG, PA., Sept. 17.—The Hiland Automobile Company is putting in a direct-connected Burke generator, with Rathbun engine of 60 horsepower, in its new garage in Center avenue, East End, to furnish power, light and heat. The Hiland has an artesian well eighty feet deep, which will deliver 450 gallons of water an hour, and this water, wnen taken from the engine, will be used to heat the building. The Hiland has also ordered a five-ton Marshall electric elevator, which will be installed shortly.

The Simms Automobile Company is building a new garage in Baum street, opposite the plant of the Standard, and will handle the Locomobile and the Lozier cars.

L. B. Martin, the Oakland automobile dealer, has sold his lease of 3904 Forbes street, to Thomas S. Booth, of Chicago, and L. J. Sixt, of Cleveland, who will open the place as a garage and repair shop. Mr. Martin has his new garage at 3923 Forbes street, fully equipped, and can justly boast of one of the most convenient establishments of its kind in the city.

The Colonial Automobile Company, which moved into its new garage in Walnut street, East End, a few days ago, has been giving its friends a very much appreciated "At Home." The garage is centrally located and is equipped with modern devices, and is already attracting a very large clientele.

IMPROVING QUAKER CITY'S AUTO ROW.

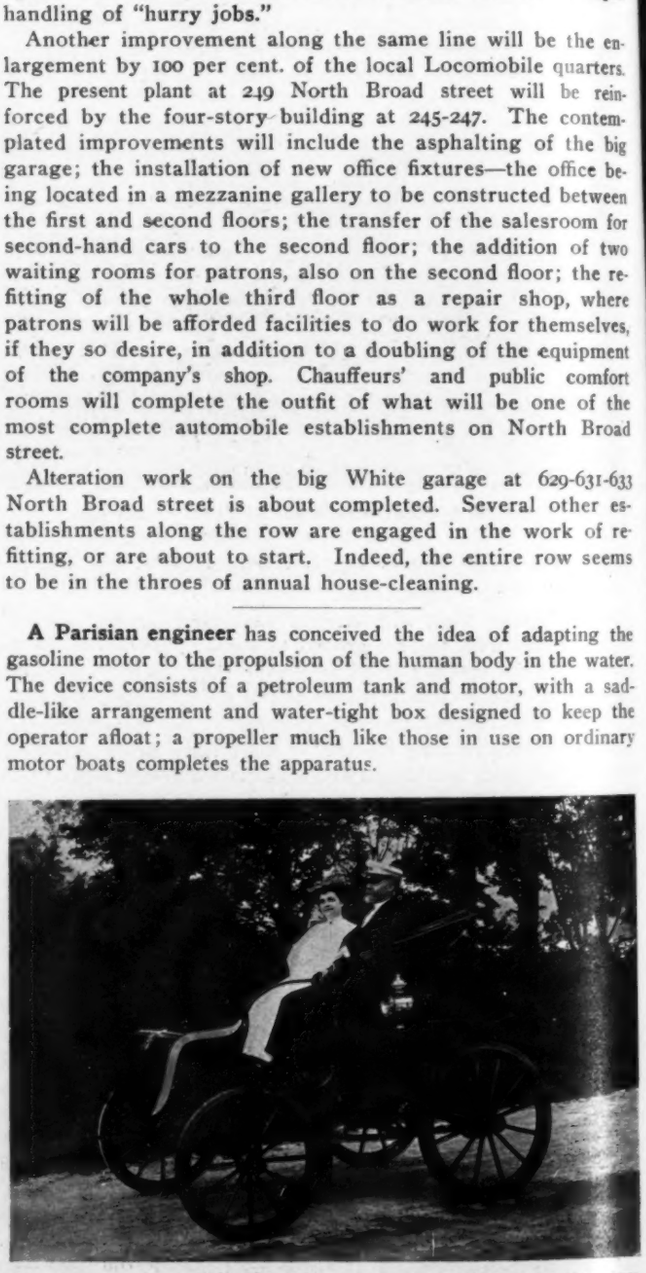
PHILADELPHIA, Sept. 17.—The Quaker City's "Automobile Row" is gradually assuming an appearance more in keeping with the magnitude of the business done. The hastily-altered and poorly-adapted ramshackle structures along North Broad street are gradually disappearing.

At 205-207 North Broad street, the new home of the Rambler is receiving its finishing touches. The new building will be a model in its line. The basement will be equipped with three wash-stands for cars, located along the rear wall. In the front, and extending under the sidewalk, which will be glassed to afford additional light, will be located the stock room, and there will be no more "waiting for parts from the factory." The first floor will be devoted to the salesroom, with garage in the rear. The second floor will be occupied by the manager, salesmen, and bookkeepers, and in the rear will be the show-room for second-hand cars. Repair and paint shops, top-making and tire-repair departments will take up the third floor, while an electric elevator will insure rapid handling of "hurry jobs."

Another improvement along the same line will be the enlargement by 100 per cent. of the local Locomobile quarters. The present plant at 249 North Broad street will be reinforced by the four-story building at 245-247. The contemplated improvements will include the asphalting of the big garage; the installation of new office fixtures—the office being located in a mezzanine gallery to be constructed between the first and second floors; the transfer of the salesroom for second-hand cars to the second floor; the addition of two waiting rooms for patrons, also on the second floor; the refitting of the whole third floor as a repair shop, where patrons will be afforded facilities to do work for themselves, if they so desire, in addition to a doubling of the equipment of the company's shop. Chauffeurs' and public comfort rooms will complete the outfit of what will be one of the most complete automobile establishments on North Broad street.

Alteration work on the big White garage at 629-631-633 North Broad street is about completed. Several other establishments along the row are engaged in the work of refitting, or are about to start. Indeed, the entire row seems to be in the throes of annual house-cleaning.

A Parisian engineer has conceived the idea of adapting the gasoline motor to the propulsion of the human body in the water. The device consists of a petroleum tank and motor, with a saddle-like arrangement and water-tight box designed to keep the operator afloat; a propeller much like those in use on ordinary motor boats completes the apparatus.



MR. AND MRS. F. A. BABCOCK IN A BABCOCK ELECTRIC STANHOPE.

Mr. Babcock is the president and head of the Babcock Electric Carriage Company, of Buffalo. The photograph was taken in Delaware Park, that city.

NEWS AND TRADE MISCELLANY.

The Besseltric Lighter Company, of Scranton, Pa., makers of the Besseltric cigar lighters, expect to put a lighter especially adapted for use in automobiles on the market in the near future.

The Davenport Motor Company, of Davenport, Ia., has sold its business to Ben C. Haupt, who has removed the plant to 311 West Third street, that city, and will continue to manufacture motors to order.

The Angelus Motor Car Company, of Los Angeles, Cal., has changed hands and is now being managed by Howard Fallon, a well-known local man, who will keep the garage open night and day in the future.

The Matheson Company, of New York, during the erection of its new building opposite its present salesrooms, 1619 Broadway, will occupy an additional salesroom in the connecting store at 1621 Broadway.

W. F. Ferman, of Tampa, Fla., has sold his automobile repair shops to the Gulf Machine and Auto Works, a corporation just formed, which will open a garage and repair station at Florida avenue and Washington street, that city.

A new building, which is to be erected on the west side of Broadway, north of Sixtieth street, New York City, has been leased for a long term of years by Emil Voigt and Gaston Rheims, for American headquarters for the C. G. V. automobiles.

The Simplex Motor Car Company, of Mishawaka, Ind., has leased the factory buildings formerly occupied by the South Bend Wagon Company, and will occupy the premises before October 1. The 1907 model will be a four-cylinder machine of 75-80-horsepower, and will sell for about $3,500.

The firm of Jerome A. Ellis & Co., 1404 Michigan avenue, Chicago, agents for the Frayer-Miller, has dissolved partnership. Report has it that the Frayer-Miller will be represented in Chicago in the future by the Franco-American Auto and Supply Company, 1406 Michigan avenue.

A. R. Kull, of the Wayne Automobile Company of New York, who is suing the Wayne Automobile Company of Detroit for $73,000 for alleged breach of contract, won a preliminary skirmish in the courts last week, Judge Newburger refusing to vacate the attachment which the New York company had obtained against the Detroit concern.

The manufacturers of the Kilgore pneumatic shock eliminators report that so satisfactory has their device proven itself in use on automobiles on the frightful roads in Mexico, that their large agents in that country have requested them to design an outfit that can be applied to the carriages now in use there.

The Motor Components Company, of Des Moines, Ia., which has heretofore made only automobile parts and brass castings, will build large touring cars for 1907, which will sell at $3,000 and $5,000. A four-cylinder motor will be used, which embodies many features patented by W. H. Kitto, of the company. The factory on East Walnut street is to be enlarged.

Herbert Lytle, who will drive the Pope-Toledo in the Vanderbilt race, equipped his car with the Jones speedometer, a duplicate of the instrument which won the reliability test of the A. C. G. B. & I. While going over the course in several instances Lytle brought the needle to its extreme limit, which means that he was driving at the rate of 100 miles per hour.

Mrs. S. H. Bassett, of Brookline, Mass., has just completed a thousand-mile tour in her 45-horsepower Columbia. From her home she traveled across Vermont to Lake Champlain, visiting Ausable Chasm and other points of interest. From Lake Champlain the route was to Saratoga and then to New York, returning home by way of New London and Newport.

The New York branch of the Aerocar Company has sold an Aerocar touring car to Philip de Ronde, a resident of Buenos Ayres, Argentine. Manager Owen satisfied Mr. de Ronde that the Aerocar air-cooled motor would work satisfactorily in the warm South American climate, and proved to his satisfaction that the car could take care of itself on bad roads by a ride up Fort Lee hill.

The American Auto Brass Company has been incorporated at Columbus, O., to manufacture all kinds of automobile and carriage lamps and a number of other brass specialties for automobiles. The capital stock of the company is $20,000, and the officers are: President, George F. Hill; secretary, E. B. Yohe; treasurer and general manager, Milo B. Lee. The company has purchased a plant at 183 West Maple street, Columbus, which it will put into operation as soon as alterations necessary to the successful conduct of business can be made.

The Motorcar Company of Detroit, manufacturers of the Carter car, with friction transmission, noting the many reports current regarding the incorporation of the Carter International Motor Car Corporation, Inc., and its intention to build a large factory at Washington, D. C., desires to state that it is in no way connected with the enterprise named, nor is Byron J. Carter, whose services have been retained exclusively, and whose patents are controlled by the Motorcar Company, in any way related to the Mr. Carter of the Washington corporation.

Although there is a Washington state law relative to the commonly accepted road rule "keep to the right," the Tacoma city council has seen fit to pass a special ordinance on the subject. The primary purpose of this is to enable the local police court to invoke a fine as heavy as $100 on violators. There are probably few cities in the country of an equal size, says a correspondent, where so little regard is paid to the "keep to the right" rule as in Tacoma. It also happens that drivers of automobiles are as soulless as the rest. It is strange that in the haphazard manner Tacoma streets are traveled there are so few accidents.

Kenneth B. Pope, of Commonwealth avenue, and his mother, Mrs. Fanny H. Pope, will leave Boston October 2 for a two months' tour of Great Britain and southern Europe. Mr. Pope has just purchased of the Linscott Motor Company a National 4-cylinder 35-40-horsepower touring car, in which his party will make the tour. The itinerary calls for a trip across England, through Scotland and across the Channel to France, Switzerland and Germany, then back to southern France and through Italy, after which the start will be made some time in December from Naples to Boston. In the aggregate about 10,000 miles will be covered.

A small handy record book, easily carried and containing a lot of information and blank spaces for notes for the use of automobilists, has been published by the Arc-Spark Manufacturing Company, of 125 West Thirty-second street, New York, and its usefulenss is in no way abridged by the fact that a few of the pages are used to describe and illustrate the W. E. B. spark plug manufactured by that concern. The plug has already been described and illustrated in THE AUTOMOBILE. Motoring laws of the various states are condensed and tabulated, and information is given regarding licenses and registrations. Then follow blanks for records of runs, spaces for expense accounts and operating charges, and motoring engagements. A list of world's records for track and straightaway runs concludes a useful little booklet.

NEW AGENCIES ESTABLISHED.

The Keystone Automobile Company, of Pittsburg, Pa., has arranged to handle the Stoddard-Dayton in 1907, and will also have the Welch agency for the Pittsburg territory.

Wyckoff, Church & Partridge, of New York City, who have represented the Decauville car in this country, have discontinued the agency for that car and will hereafter handle the Stearns in the metropolitan district.

The agency for the Carter car for eastern Pennsylvania, Delaware, and southwestern New Jersey has been placed with Henry A. Rowan, Jr., & Co., 2028 Sansom street, Philadelphia, who will carry a complete stock and energetically push the sale of the car in the territory named.

PERSONAL TRADE MENTION.

A. L. Bennett, formerly assistant manager of the old Mors Automobile Company, has associated himself as sales manager with the new Mors representatives for this country—Cryder & Company, 583 Park avenue, New York City.

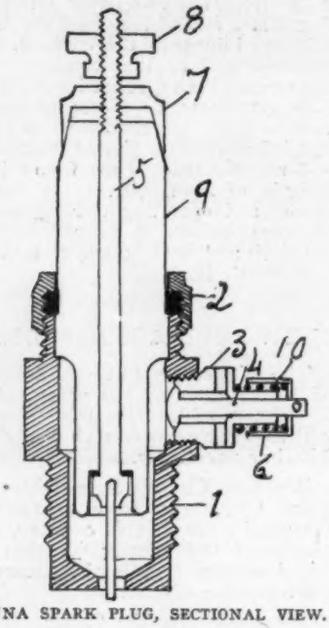
R. Harry Croninger, sales manager of the Dayton Motor Car Company, of Dayton, O., has returned to the office after a serious illness. He was absent about two months, the most of which time he spent recuperating among the hills of Kentucky.

E. L. De Camp has been appointed general manager of the Kansas City Motor Car Company, of Kansas City, Mo., to succeed George K. Wheeler. L. M. Deitrich, lately with the Aerocar Company, of Detroit, Mich., will have complete charge of the designing and building of the Kansas City company's commercial trucks, which, it is understood, will be made a leading feature hereafter.

Cards are out announcing the marriage of Percy Owen to Miss Marian Barr Nichols, the ceremony to take place at Trinity Church, Haverhill, Mass., October 9. Mr. Owen is the well-known metropolitan representative of the Aerocar, and was formerly the New York manager of the Winton branch. Possessing a multitude of friends, Mr. Owen's essay into the matrimonial market will result in a shower of congratulations.

INFORMATION FOR BUYERS.

AIR-COOLED SPARK PLUG.—An extremely interesting solution of the spark plug problem is that given by John F. McCanna, of 244 Wells street, Chicago. The McCanna spark plug, as the accompanying illustrations show, is fitted with a tiny air valve outside of the cylinder, communicating with an annular chamber surrounding the porcelain. The valve opens inward, the spring keeping it normally closed. When the piston of the engine descends on the suction stroke a current of air is drawn in through the valve, passing around the end of the porcelain center insulation and out into the cylinder through the small opening around the central electrode. The rapid rush of the air sets up a scouring action that keeps the parts clean and at the same time cools the plug. In the line drawing 1 is the plug body, 2 is the packing nut, 3 the air valve body, 4 the air valve, 5 the central electrode with platinum tip, 6 the air valve spring cap, 7 the porcelain cap, 8 the binding nut, 9 the porcelain and 10 the air valve spring. The manufacturer states that under trying tests in motors of different styles the plug has never failed to give satisfactory results, regardless of a superabundance of oil or gasoline.



M'CANNA SPARK PLUG, SECTIONAL VIEW.

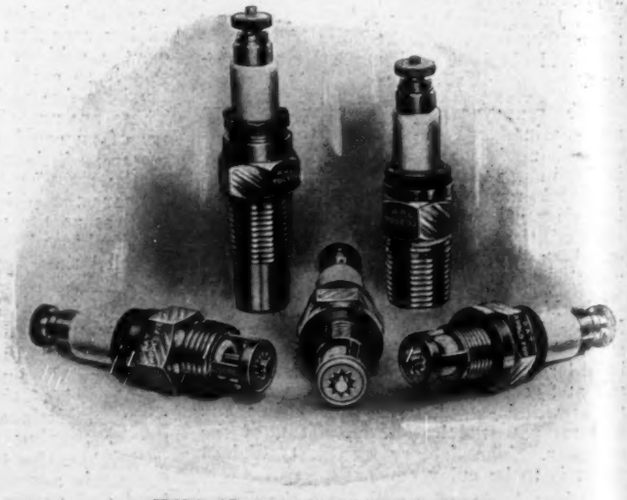
EXTERIOR VIEW OF M'CANNA PLUG.

AUTOMOBILE SPECIALTIES.—A catalogue of automobile electrical specialties has been issued by the Chicago Battery Company, of Michigan avenue and Fourteenth street, Chicago, manufacturers of the "Duro" electrical appliances for automobiles. Among the articles listed are portable dry storage batteries, made in various sizes and styles for different classes of work; highly finished battery cases, for use where batteries are carried on the footboard; charging outfits, resistances, and so on; electric lamps for all automobile uses, including headlights, which, in the large sizes, are said by th manufacturers to be more powerful than acetylene lamps; electrical instruments, switches, cable, connections, and so on in variety.

AUTOMOBILE INSTRUCTION.—A booklet issued by the West Side Auto Transportation Company, of 309 West Forty-first street, New York, gives an idea of the manner in which work is carried on at the school, which is an important part of the establishment, and is illustrated with views showing the classes at work and the place where the work is done. Practical work is done on several school cars. A garage in connection with the school gives advanced students an opportunity to become familiar with many different makes of cars.

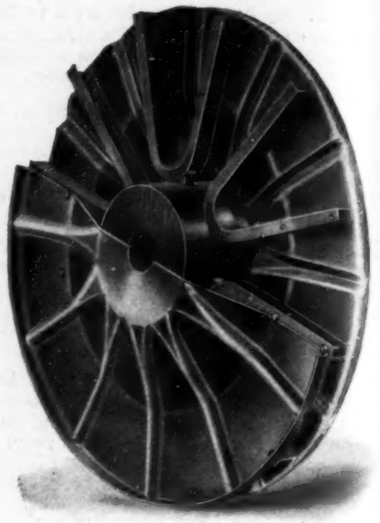
A NEAT SOUVENIR.—A very neat, attractive little souvenir, and one that should certainly keep the recipient in mind of the giver, has been sent out by the St. Louis Motor Car Company, of Peoria, Ill. It consists of a leather coin purse, just the thing for keeping loose change in.

ARC TOLEDO PLUG.—The efforts of manufacturers to bring out spark plugs that will not become fouled and refuse to spark are constant, and the improvement made in spark plugs has, as a result, been very marked. One of the latest plugs is that placed on the market by the Arc Toledo Spark Plug Company, of Toledo, O. This concern was formerly known as the Arc Spark Plug Manufacturing Company, but owing to the similarity of the title to that of another company a change was made. In the accompanying illustration the plug is shown in various positions, and the construction can be seen quite clearly. The feature is the arrangement of the sparking points. The central electrode is threaded, like a screw, and is made of a special alloy, while the outer electrode is a copper ring surrounding the center electrode, having its inner circumference cut into ten teeth or points. The combination of points and threads gives a very large number of possible jumping points for the spark, and the possibility of all these points being sooted is, the manufacturers state, very remote indeed. In fact, they go so far as to say that the sparking of the plug is unaffected by flooding of cylinder with oil or gasoline. The insulation is of porcelain and all parts are interchangeable.



GROUP OF ARC-TOLEDO SPARK PLUGS.

STEEL AUTOMOBILE WHEELS.—A pamphlet describing the indestructible steel automobile wheel has been issued by the manufacturers, Turner and Fish, of 17 Quincy street, Chicago. The Indestructible wheel consists of two disks of steel of concave form, riveted together with the edges together and the hub parts spread. The steel is of high carbon grade, cold rolled. Wheels are made in three thicknesses of metal and weigh from 11 1-2 to 19 pounds, according to the metal used; they will sustain loads of from 15,000 to 50,000 pounds. Before the plates are riveted together they are copper-plated and enameled, and the enamel baked, protecting the steel from rust. The outer edges of the plates are flanged out to carry the rim, which is usually shrunk on, as is the tire of a carriage wheel.



"INDESTRUCTIBLE" STEEL WHEEL.

FORD FOLDERS.—Under the titles "Planetary versus Sliding Gear Transmissions," "Ignition," "One-Piece Drop Forged Camshafts," and "The Ford Six on the Road," the Ford Motor Company, of Detroit, Mich., has issued a series of little folders containing some very interesting and instructive points on these important automobile subjects. While the idea is, of course, to bring out the good points of the Ford cars, there is much that is of real interest to all automobilists, regardless of the car they drive.